

ARTICLES on design, construction and operation of oil-engines and motorships by the world's foremost writers on marine engineering.

# Motorship

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ILLUSTRATIONS of the newest designs in international merchant motorship and Diesel-engine construction and auxiliary equipment.

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No. 7

## Diesel Electric Tankship J. W. Van Dyke

Vessel of 7500 Tons d.w. Capacity Converted from Steam for  
Atlantic Refining Co. of Philadelphia.

By the "Atlantic Seal"\*

INSTALLATION of a Diesel electric drive in the 7500-ton tank vessel J. W. VAN DYKE, owned by the Atlantic Refining Company, is of particular interest at this time when shipowners throughout the world are turning their attention to the Diesel engine as a substitute for steam in the propulsion of cargo and passenger vessels. Departing from the usual arrangement of direct Diesel drive, the Diesel electric combination was selected for this vessel with the object in view of providing independent multiple units for generating electric power to operate an electric motor drive direct-connected to the propeller shaft. This arrangement, with its light-weight units as compared to the heavy direct Diesels, is particularly adaptable to the conversion of vessels now equipped with steam-driven propelling machinery, and with its economical features of installation

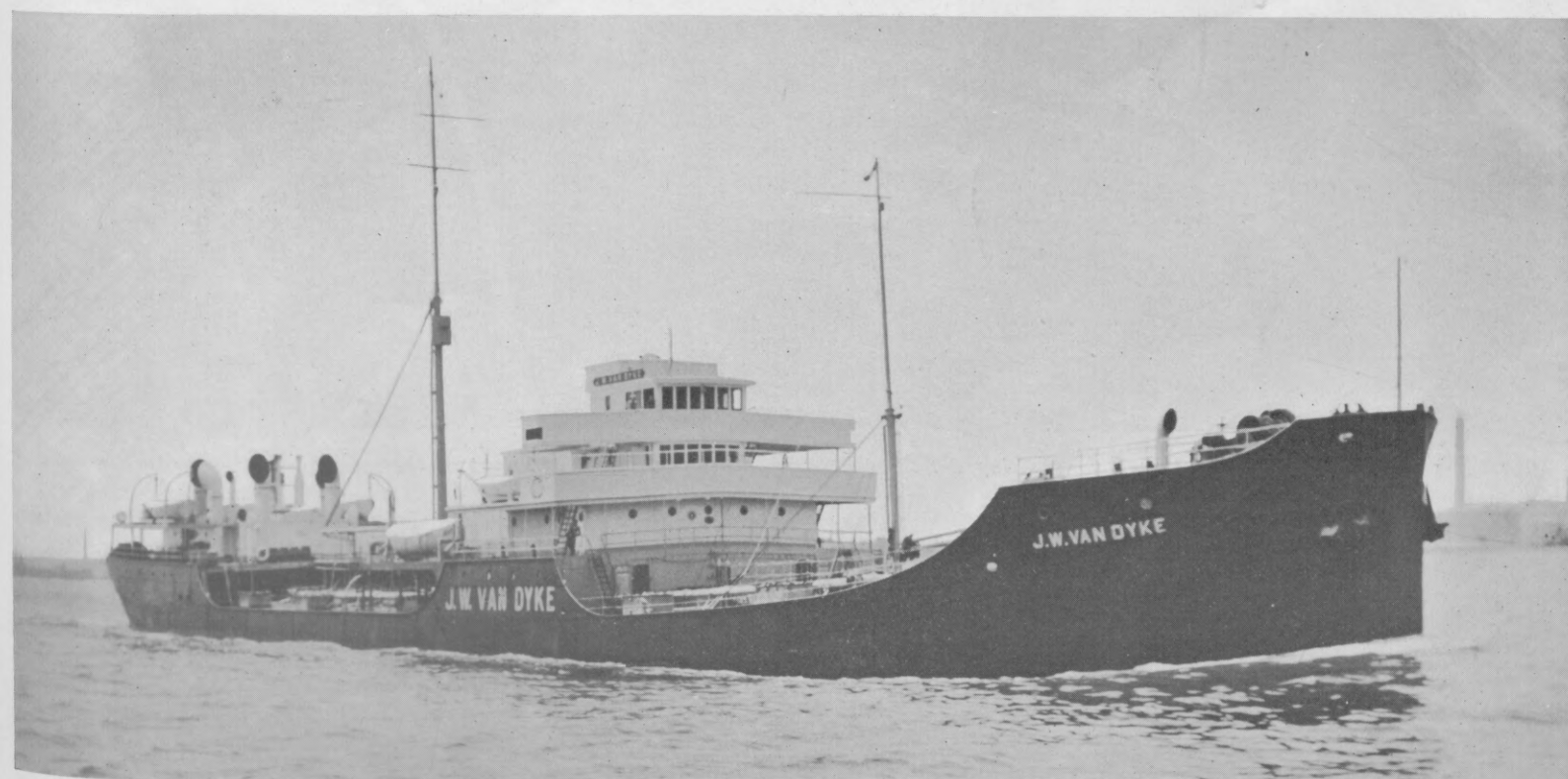
and operation, should prove a valuable element in the development of our merchant marine to meet the keen competition of foreign shipping interests.

Completion of sea trials of this vessel, the largest in point of tonnage yet converted to the Diesel electric drive, bears out the judgment of the designers and marks an important step in establishing this type of drive in the field of large ocean carriers. In view of the element of reliability introduced by the multiple units, and the ease with which they may be spread over the comparatively large installations found in passenger vessels, it is to be expected that this method of propulsion will find favor with any type of vessel.

Highly successful application of the Diesel electric principle to a number of smaller vessels, particularly tug boats, where the necessity of absolute control for rapid maneuvering and extreme flexibility of drive are of prime importance, has

demonstrated, beyond a doubt, the desirability of this type of drive for vessels destined for use in river and harbor work. After experience with this type of vessel, J. W. Van Dyke, President of the Atlantic Refining Co., has reached the conclusion that the principle is fundamentally correct in fulfilling the requirements of ships.

The J. W. VAN DYKE, formerly the S.S. ALLENTOWN, was purchased from the United States Shipping Board, to whom she was delivered from the yards of Pusey, Jones & Co., Gloucester, N. J., in 1918. She was originally laid down for the Cunard Company, but was taken over by the Shipping Board during the war period. The work of reconditioning the hull and installing the Diesel electric propelling machinery and auxiliaries was carried out at the yards of the Staten Island Shipbuilding Co., Staten Island, N. Y., under the direction of L. M. Goldsmith, of the Atlantic



Tankship of the Atlantic Refining Company converted from steam to Diesel-electric propulsion

\* Monthly house magazine of the Atlantic Refining Co., Philadelphia, Pa.

Refining Company. The development of plans for conversion of the J. W. VAN DYKE, and the carrying out of the various steps in the installation, have been facilitated by the cooperation of the officers of the Shipping Board, who have made every effort to assist in bringing the work to a successful conclusion.

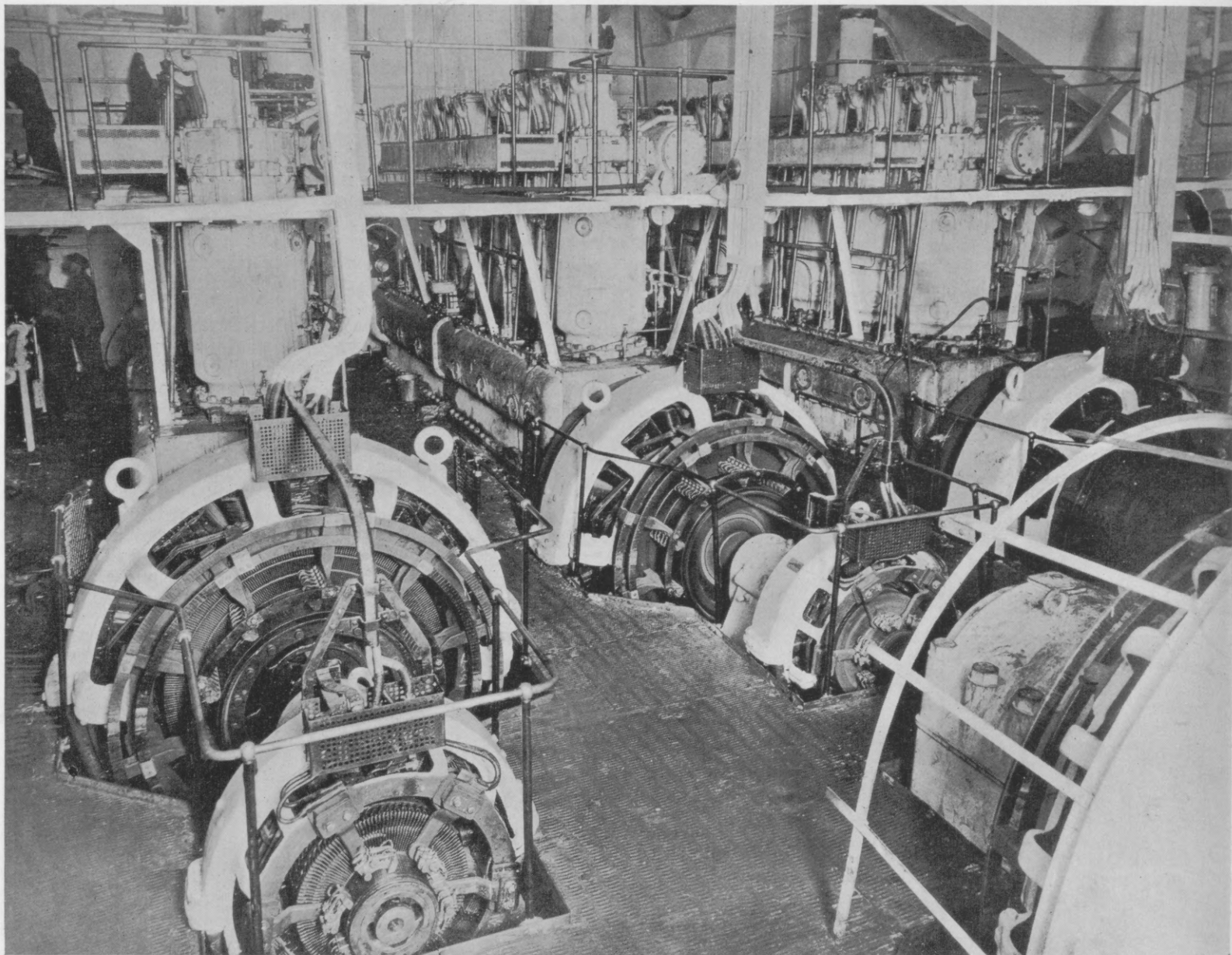
The hull is of the approved tanker type, having 11 cargo tanks with 8 summer tanks, with pump room amidships and propelling machinery aft; the Isherwood system of longitudinal framing is used throughout. The principal details are as follow:

Length overall.....380 ft. 0 in.  
Length b.p. ....365 ft. 0 in.

removal of this equipment, the screen bulkhead between the boilers and engine room was cut out, giving a single compartment for the entire Diesel electric installation. On account of the reduced fuel consumption, the fuel oil tankage was reduced, a part of the original tanks being released for cargo service.

The general arrangement and operation of the propelling machinery may be briefly described as consisting of a multiple generating plant made up of three independent electric generating units, which supply current to a main drive motor direct connected to the propeller shaft. Control is operated from the pilot house by variation of the field excitation on the main genera-

by a single fuel pump which supplies all six cylinders through a central distributor. This method of injection, without the use of high air pressure, eliminates one of the most troublesome features found in the usual type of air injection Diesel. The fuel is injected into a precombustion chamber separated from the cylinder proper by a restricted passage, so that ignition does not take place in contact with either the cylinder walls or piston head. Cooling water for the cylinder jackets is circulated by a Northern rotary pump, motor-driven, the water first passing through the main oil coolers where the lubricating oil for the engines is cooled prior to recirculation. Part of the discharge water from the



*Engine-room of the J. H. Van Dyke showing the three Diesel-electric power sets and part of the main propelling motor*

Molded beam.....50 ft. 9 in.  
Molded depth.....31 ft. 3 in.  
Block co-efficient.....0.794  
Cargo capacity.....60,000 bbl.  
Speed .....11 knots

It is interesting to note that the capacity was increased by 5400 barrels as a result of the new machinery installation.

The original propelling machinery consisted of a General Electric turbine of 2400 s.h.p., driving a single screw through a set of double reduction gears. Steam for propulsion and auxiliaries was supplied by three water tube boilers. With the re-

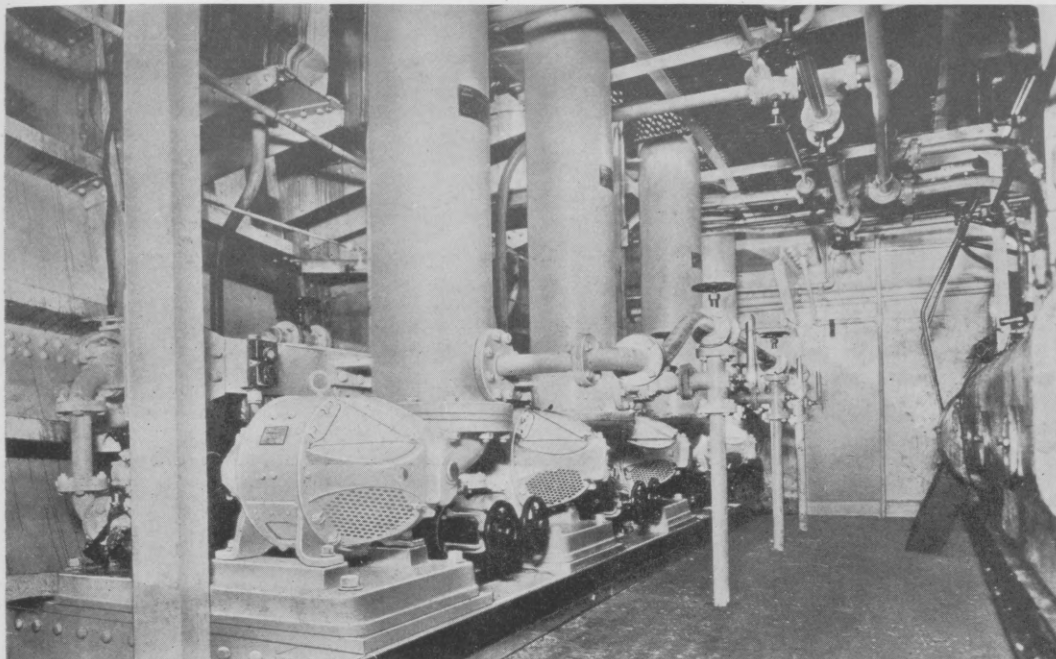
tors. Auxiliaries are electrically operated, and steam for heating quarters is produced from the exhaust of the Diesel engine.

There are three generating units, each consisting of a six-cylinder 19½ in. by 24 in. airless-injection engine, built by the Ingersoll Rand Company and developing 840 b.h.p. at 225 r.p.m., direct connected to a 600 kw. 250-volt Westinghouse direct current generator with a 50 kw. exciter. The Diesel engines operate at 68 lb. per sq. in. brake m.e.p. with compression of 350 lb. per sq. in., fuel being injected at approximately 3000 lb. per sq. in. pressure

jackets is by-passed back into the suction at the pump, in order to temper the incoming water.

There are three systems of lubrication: a high pressure system forcing oil to all bearings and wristpins through the crank shaft, a splash feed from the crankcase, and a gravity feed from overhead filter tanks, any one of which is capable of lubricating the engine at full load.

The engines operate at constant speed, regardless of the load, control being maintained by an automatic governor of simple design which functions by by-passing into



*Pumps and coolers for piston cooling oil of main engines*

the suction of the fuel pump, feeding to the spray nozzles only the oil necessary to carry the load, and in addition an over-speed governor automatically shuts the engine down at 15 per cent over speed. Both Diesel engine and generator are mounted on the same longitudinals, giving a very rigid construction which insures lack of vibration. The exciters are mounted on an extension of the generator shaft. The generators and exciters are cooled by natural ventilation.

The generators are connected in series through the switchboard to the main drive motor, with control switches so arranged that any generator may be taken out of the circuit. In addition to supplying power for propulsion, the generators may be operated at fixed voltage to supply power to the main cargo pump motors and for over-board use. Current from one exciter is used for field excitation of both the generators and main drive motor. A second exciter supplies power for operating all of the electrically driven engine room auxiliaries and deck machinery, while the third is held as a standby for either purpose.

The ship is propelled by a 2300 s.hp. 750-volt direct current double armature Westinghouse motor, direct connected to the propeller shaft through a Kingsbury thrust bearing. The motor is designed to develop full power at 100 r.p.m. The two armatures are independently wired so that either one may be operated without the other. Cooling is carried out by positive air circulation.

The four-bladed propeller is of the built-up type, with cast iron hub and bronze blades, designed by Dr. S. E. Slocum. It is 12 ft. 6 in. diameter with variable pitch.

The generating output and propelling motor speed are controlled by the Ward-Leonard System of variable field excitation. The method by which this system operates is as follows: The main drive motor is shunt wound with interpole fields, the fields being excited at constant potential in one direction; the variation of the motor speed and direction is therefore dependent solely on the voltage and direction of the current

supplied to it, which is brought about by proportional variation in the field excitation of the shunt wound constant speed generators. The generator fields can be excited to vary both voltage output and direction.

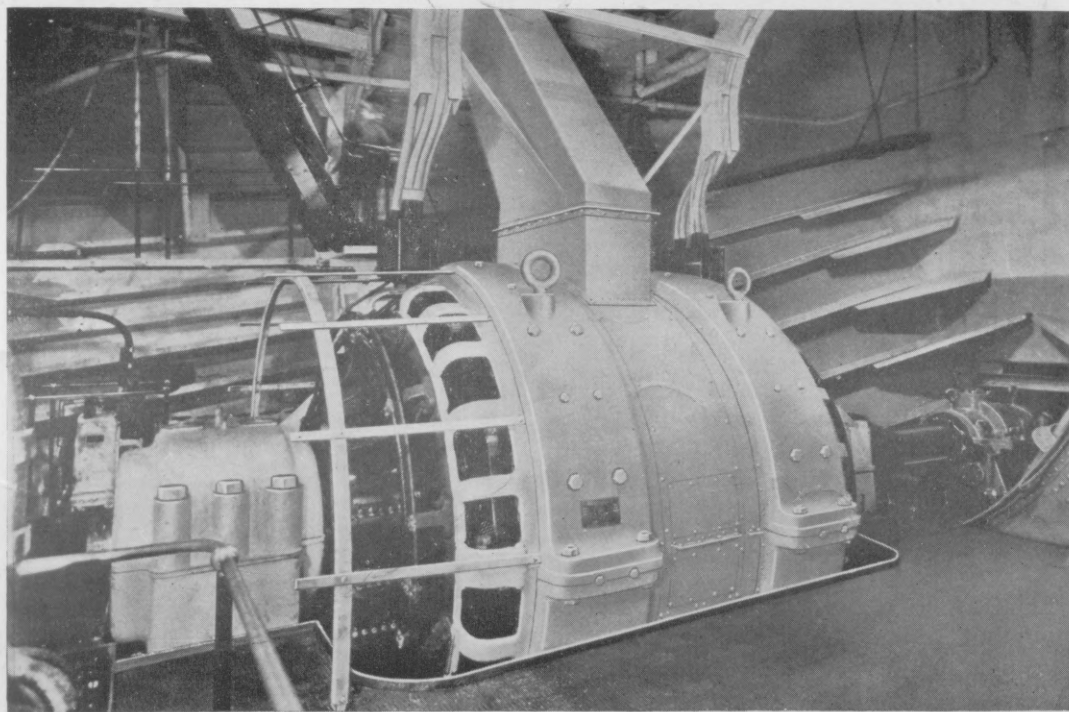
The control is located in the pilot house, to which point the field excitation full voltage is carried and varied by the use of a regulation rheostatic controller lever operated from either port or starboard side of the house. As the current carried to the rheostat control is low in amperage, amounting to less than 2 per cent of the generator output, the installation is very simple and the electric loss is negligible.

The generators are connected in series, which simplifies the operation in that it does away with the necessity of running the three generators at the same speed, variation in generator speed simply bringing about a proportional increase or decrease in load on that particular unit, without upsetting the operation or control.

The only departure from complete pilot-house control, while the vessel is under way, occurs when a generator is shut down. This reduces the voltage by one third, which results in a proportional decrease in the speed of the drive motor, but the power required to drive the vessel being in proportion to the cube of the speed, the condition would then exist that the propeller would be turning too slowly to absorb the power coming from two generators. It is therefore necessary in such case for the engineer to weaken the field of the main motor, using switchboard control, in order to speed this motor up to a point where the propeller can absorb the full power generated. Weakening the field of the motor at constant voltage results in increased speed. This field weakening, however, is only an adjunct to the pilot house control, and is used to maintain the engines at their rated load.

When the vessel is in port and the output of the generators is to be utilized for operating the cargo pumps or other like service, the generators are placed in operation on fixed voltage, working in identically the same manner as ordinary direct current generators. Under these conditions the pilot house control is not in circuit, the generator being handled from the engine room switchboard, and the electrical contacts are so arranged that the power cannot be transferred to the propulsion control as long as there is any voltage at the output terminals. This arrangement is necessary in order to prevent accident in case the pilot house control is accidentally put into the "on position" while the generators are operating in this manner.

The construction of the switchboard is unique, in that the connections and buss-bars are built back at right angles to the main panel, all switches being operated from the front of the board entirely by the use of hand wheels. This leaves the front of the board entirely dead. In addition to the main power circuits, the switchboard carries controls for all auxiliaries. Recording wattmeters are placed on the switchboard to show the exact power from each generating unit.



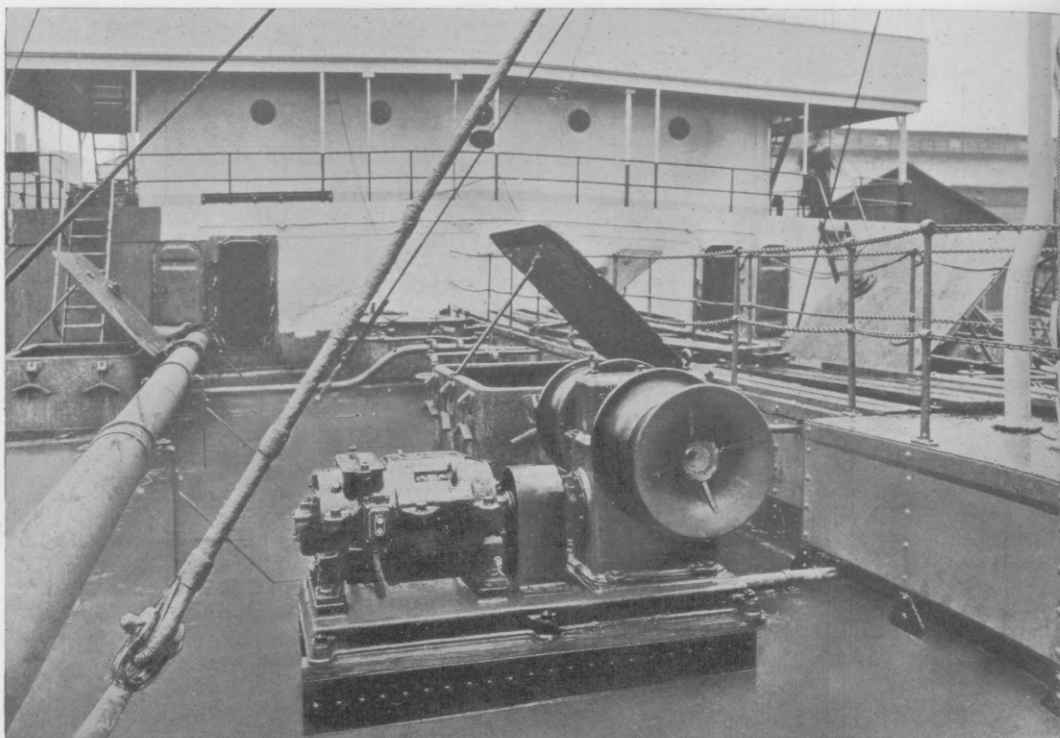
*Main propelling motor of the J. W. Van Dyke*

Cargo is handled by two Northern rotary pumps with 8 in. suction and 8 in. discharge, each having a capacity of 2200 bbl. per hour and each driven by a direct connected 75 hp. Westinghouse 40 degree d.c. motor, operating at 1200 r.p.m., with 50 per cent speed control. In order to overcome the fire risk, due to the presence of electrical equipment in the pump room, the two motors are enclosed in a separate compartment amidships, the drive shaft to each pump passing through a stuffing box in the gastight bulkhead. The rheostat controllers for operating the pump motors are located in the main engine room, the controllers' handle being actuated by a small motor, which in turn is operated by a push button in the pump room. The pumps being of the positive displacement type an electrical meter is attached to each one, which shows on a dial the output of the pump in barrels per hour.

In operating the pumps, the starting button is pushed in and held until the desired speed of pumping is reached, when release of the button stops the actuating motor and the pump continues to perform at the same speed. In the same way, speed of pumping may be varied within the limits of the pump operation, giving a very simple and flexible control.

Steering is accomplished by means of an electric hydraulic steering gear, manufactured by the Hyde Windlass Company. In addition, there are installed a Sperry gyro-compass and gyro-pilot.

The steering control departs somewhat from the usual gyro-pilot arrangement. In this case, the gyro-pilot is not installed in the pilot house with the motor driving steering wheel, which in turn, through rods, actuates the steering engine, but is replaced by a form of electric telemotor direct-connected to the control valve on the steering engine. This telemotor takes its impulses from the gyro-compasses in the pilot house, moves the steering engine valve and in that way changes the rudder angle.



*Worm geared winch for handling lines*

The gyro-pilot, of course, is only used for navigating at sea. When the vessel is in a harbor, where hand control is necessary, the gyro-compass does not directly operate the telemotor, but is thrown out of service and the small electrical contacts are operated by hand, which gives impulses to the telemotor, thus giving an electrical hand control. If, however, this telemotor should be out of order, it can be disconnected, and the ship can be steered from the lower steering position in the midship house, directly by rod control from the steering wheel to the steering engine valve.

This arrangement of having the gyro-pilot aft greatly increases the steering efficiency because the impulses from both the compass and from the hand electric

control do not have to be transferred through a number of mechanical devices.

All auxiliary pumps are of the rotary gear type, built by the Northern Pump Co., with direct connected motor drive. The motors are of a special type, enclosed and ventilated, with push button controls, the control boxes being mounted adjacent to the main switchboard, and only the control button wiring being taken down to the motor. A motor-driven Sturtevant blower supplies air for cooling the main motor.

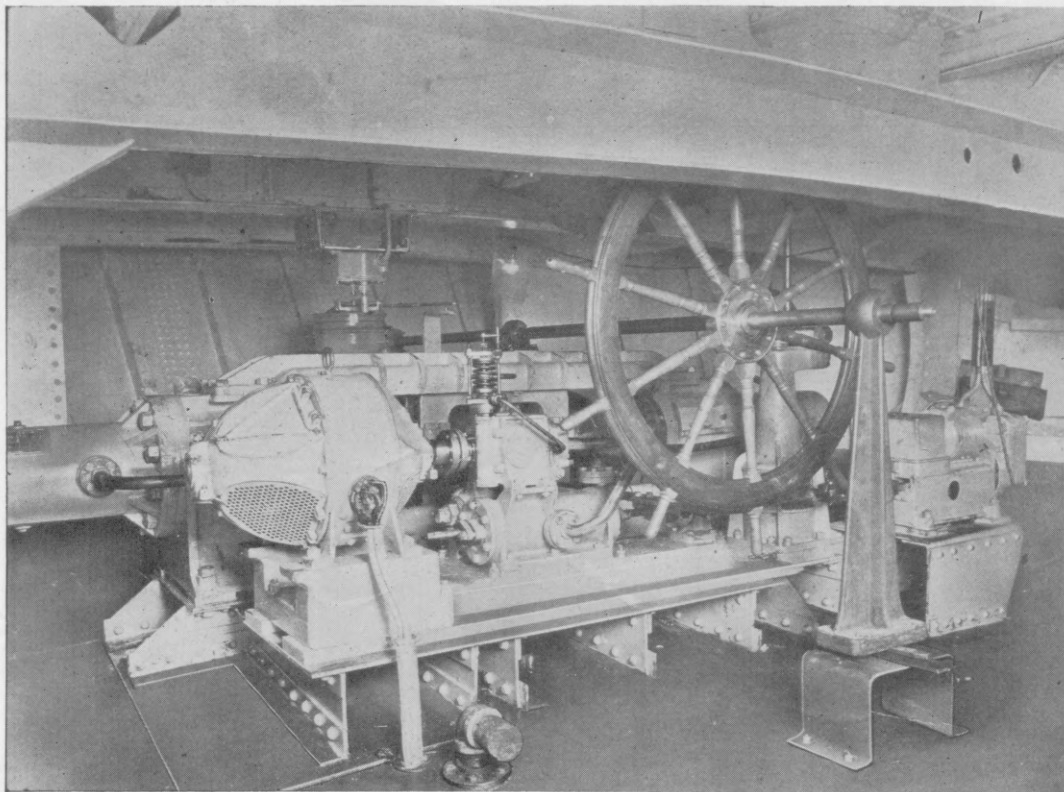
An auxiliary generator, installed on the engine room flat, is used in port to supply power for operating the sanitary pump, fresh water pump, ice machine, and for lighting. This is to obviate the use of a large generator for small power requirements, and, inasmuch as this unit can be cranked by hand, it can supply power in an emergency to run the air compressors and thereby obtain the necessary starting air for the large engines if the pressure in the air tanks is too low.

This unit consists of two 3-cylinder 18 hp. Hill Diesel engines, connected through two dog clutches to a 25 kw. Westinghouse generator placed between the two engines.

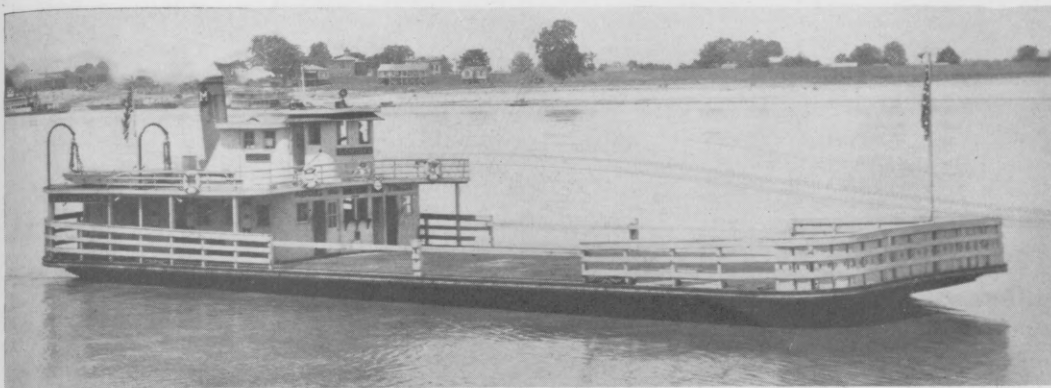
Starting air pressure in the tanks is maintained automatically, the electrically driven compressors starting up when the minimum pressure is reached and shutting off at the working pressure.

Steam for heating the cargo and for all other heating purposes on the ship is generated by the use of the exhaust gases from the main Diesel engines. The exhaust pipes from the Diesels are carried to two vertical Davis Engineering Co. waste heat boilers. Each boiler is provided with a bypass, with valves, so arranged that it is not possible to shut off the exhaust against the engine. By the use of these exhaust gas boilers, steam is supplied without expenditure of fuel except in port, a small oil burner being provided for use when the engines are shut down.

An electric windlass supplied by the Hyde Windlass Co. is used for handling anchors. The deck winches are rather unique. They were designed and built by



*Electric-hydraulic steering engine controlled by telemotor for gyro-pilot*



*El Capitan II, a Southern oil-engined ferryboat operating 18 hours a day*

### Lower Mississippi Ferry

In the Natchez & Vidalia Ferry service across the Mississippi between these two cities in Mississippi and Louisiana, the motor-vessel EL CAPITAN II is running opposite the steamer EL CAPITAN on 15-min. trips, 18 hours during the day. The motor-ferry, built by the Ayre & Lord Marine Ways of Paducah, Ky., is 100 ft. long by 30 ft. beam, with 4 ft. guards all around, and 5 ft. deep. The hull is constructed of full length strakes of fir, and she is built with two fore and aft bulkheads and three cross bulkheads making twelve watertight compartments. She is of the scow type, with 20 ft. rakes. Powered with two 4-cylinder 60 hp. Fairbanks Morse engines, turning 42 in. by 32 in. Hyde propellers, the boat makes a speed of about 14 miles per hour. Both engines are controlled from the pilot house, and air is used for throwing the clutch. A 2¼ kw. Universal lighting set supplies current.

### Another Ferryboat Order

A new ferryboat for the Gloucester & Yorktown Ferry Company of Yorktown, Va., is being built by the Spedden Shipbuilding Company, Inc. of Baltimore. The vessel, which will be 113 ft. long, 32 ft. wide and 12 ft. deep, is virtually a duplicate of the Hudson-Athens ferry which has been operating so successfully on the Hudson River for the last few seasons. The chief difference is that the new boat will have a 240 s.hp. Fairbanks Morse engine. The plans of the vessel were made by Eads Johnson.

### New Tacoma Ferry

A new ferry named the WOLLOCHET, 100 ft. in length o.a., 34 ft. beam and of 10 ft. depth, is being placed in service in the Tacoma district. She was built by the Skansie Shipbuilding & Transportation Co. of Gig Harbor, Wash., and engined with a 150 hp. Fairbanks Morse motor. These same builders last year built the ferryboat CITY OF STEILACOOM, 110 ft. in length with 34 ft. beam and 10 ft. depth, powered with a 200 hp. Fairbanks Morse engine.

The State of Washington was the first in this country to have the distinction of possessing oil-engined ferryboats, the first one having been introduced there almost ten years ago. Many have been built during the last ten years and there are now two building on Puget Sound which will be almost as large as the biggest steam ferries in the country.

### A Virginia Ferry

A ferryboat carrying 16 autos and 200 passengers makes the trip every hour between Jamestown Island and Scotland Wharf, Va. She is appropriately named the CAPT. JOHN SMITH and is owned by A. F. Jester of Smithfield, Va. Her registered measurements are length 60.5 ft., depth 8.5 ft. and breadth 24.2 ft. She makes about 10 miles per hour with a 60 hp. Fairbanks Morse engine.



*Capt. John Smith, a Virginia ferry*

### Amended License Rules

Two minor changes have recently been made in the regulations of the Steamboat Inspection Service relating to the qualifications required for second assistant engineer and third assistant engineer of motor-vessels. Formerly a journeyman machinist who had been engaged in the construction or repair of marine motor engines for two years, together with one year's service in the engine department of

motor vessels as oiler, was eligible for examination as an applicant for a license as third assistant engineer. According to the new rule he will be eligible for examination as an applicant for license as second assistant engineer. Anyone with three years' service as an apprentice to the machinist's trade and engaged in the construction or repair of marine, stationary or locomotive engines, together with one year's service in the engine department of motor vessels as oiler, will henceforth be eligible to apply for examination for a license as third assistant engineer. Formerly the same man would have been able to apply for examination for his license as second assistant, but he no longer will have that privilege.

President Coolidge's recommendation that the sale of ships be turned over to President Palmer of the Emergency Fleet Corporation has been accepted by the Shipping Board. The benefit of this change is that a prospective purchaser will now have to deal with only one man instead of the seven members of the Board, but inasmuch as the Shipping Board retains the power to reject Palmer's recommendations the improvement is solely on the negotiations.

Senator McNary of Oregon, a member of the Senate Committee on Commerce, states that a new subsidy plan will be proposed to the next Congress differing considerably from the project defeated during the Harding administration. Senator McNary believes there will be practically no question of favorable action by Congress if subsidies are employed for promoting freight services which will benefit the agricultural interests.

"Sell your useless ships to American business men who will spend money to make them more useful. If they are going to spend a great deal of money to put ships in shape where they can compete with the ships of other nations, we must bear that in mind when making a price. The public is the owner of the ships and the public seems clearly to say to me that if buyers will offer to put in modern Diesel propelling machinery I should recommend to the Shipping Board that the cost of a ship whether \$1 a ton or \$1 for the ship is not important." These remarks were made by Chairman O'Connor of the Shipping Board at a dinner to which he was invited by the Marine Writers' Society last month.



*A Pacific Coast oil-engined ferryboat of large capacity*

### A River Pushboat

At Louisville, Ky., the Kosmos Portland Cement Company has a flat bottom steel workboat of 150 hp. capable of pushing a steel barge loaded with 1,000 tons at a water speed of about 5 miles per hour. Another measure of the capacity of this boat is furnished by the statement that she can be used to push two coal or sand barges measuring 110 ft. by 24 ft. and drawing 6 ft. loaded. In the picture of the boat on this page can be seen the two bumpers installed at the forward end of the deck for butting against the scows or barges which have to be pushed. The boat was built by the Nashville Bridge Co. in 1922 and two 75 hp. 3-cylinder Kahlenberg reversing engines were installed. There is a  $1\frac{1}{2}$  hp. auxiliary belted to a compressor and to a  $\frac{1}{2}$  kw. generator. The two engines are installed under the after part of the deckhouse, forward of which there is a stateroom containing four bunks and a large galley.



*Kosmos Portland Cement Co.'s workboat for pushing scows*

### Small Fruit Carrier

In reply to a recent inquiry about the service they are getting from their motorboat MARY MARGARET, the owners, E. & P. R. Eaglesfield, fruit shippers of Benton Harbor, Mich. wrote that the answer is 100 per cent. On a length of 65 ft. and 18 ft. beam with 9 ft. molded depth, the MARY MARGARET has a freight capacity of about 100 tons. With her usual load she makes about 11 miles per hour, which is reduced to 10 miles per hour when she is loaded to capacity. When light she can make about 12 miles. The owners use her on a 100-mile run and are able to keep her in service about eight months of the year, the remaining four months being lost due to ice. This boat affords an instance of a service that could not be duplicated by a steamer, because the heat from the boilers would spoil the fresh fruit which makes up a large part of the shipments. The propelling engine is a Kahlenberg with four cylinders of 10 in. diameter and  $10\frac{1}{2}$  in. stroke, developing 100 hp., turning a 48 in. by 48 in. wheel at a little over 300 revolutions. Her owners state that she burns about  $8\frac{1}{2}$  gal. of furnace oil per hour, which is about one-third the cost of

gasoline, and it is their belief also that the oil engine is more reliable than the gas engine.

Marking the advent of American built Diesel engines in upriver craft on the Yangtse River in China, a 110 ft. boat built for Roscoe & Hambleton, Inc. of Shanghai, was launched recently at the Huh Hsing Plant in Shanghai. It is stated that the success of this boat will lead to a fleet of American-engined boats for passenger and freight service between Chungking and Kiating on the upper Yangtse.

Reports last month of the loss by fire of the motorship WAKENA in the Pacific referred to a gas engined vessel of 399 tons.

A total traffic of 92,000,000 tons was handled in the foreign commerce of the United States last year, of which the exports accounted for 52,000,000 tons. This traffic was handled through 181 domestic ports, and 64 of them handled more than 100,000 tons in the year. New York led with a total of about 22,000,000 tons, followed by New Orleans with 8,000,000 tons, and then in turn Baltimore, Philadelphia, Los Angeles, Buffalo, Galveston, San Francisco, Norfolk and Boston.

During the fiscal year 1924 American vessels carried about 40,000,000 tons of our combined imports and exports, which totalled 92,000,000 tons during the twelve months. This proportion represented 44 per cent of the total foreign commerce.

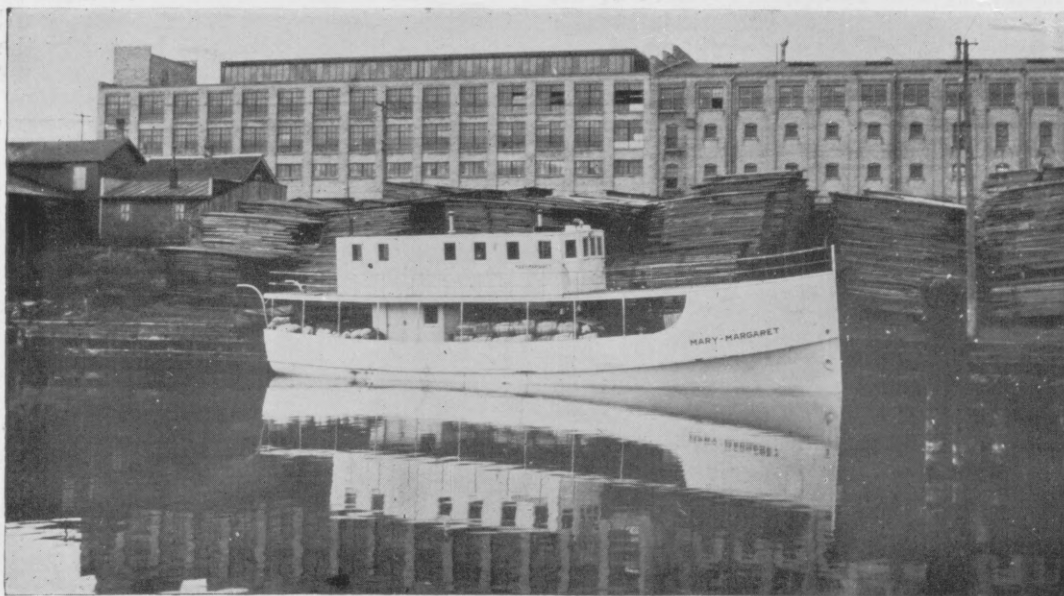
### American Marine Exposition

Much broader is the scope of the Marine Show to be held in New York next November than has been the case in any of the previous exhibitions organized by the American Marine Association. A decision has been made by the executive committee to include ports and transportation in the show. Previously these annual exhibitions have been confined to shipbuilding and marine engineering, with the result that the appeal has been restricted to steamship owners and operators. By adding sections for passenger and cargo transportation, steamer ownership and operation, port, dock and terminal improvement, the Marine Association has greatly increased the interest of the show.

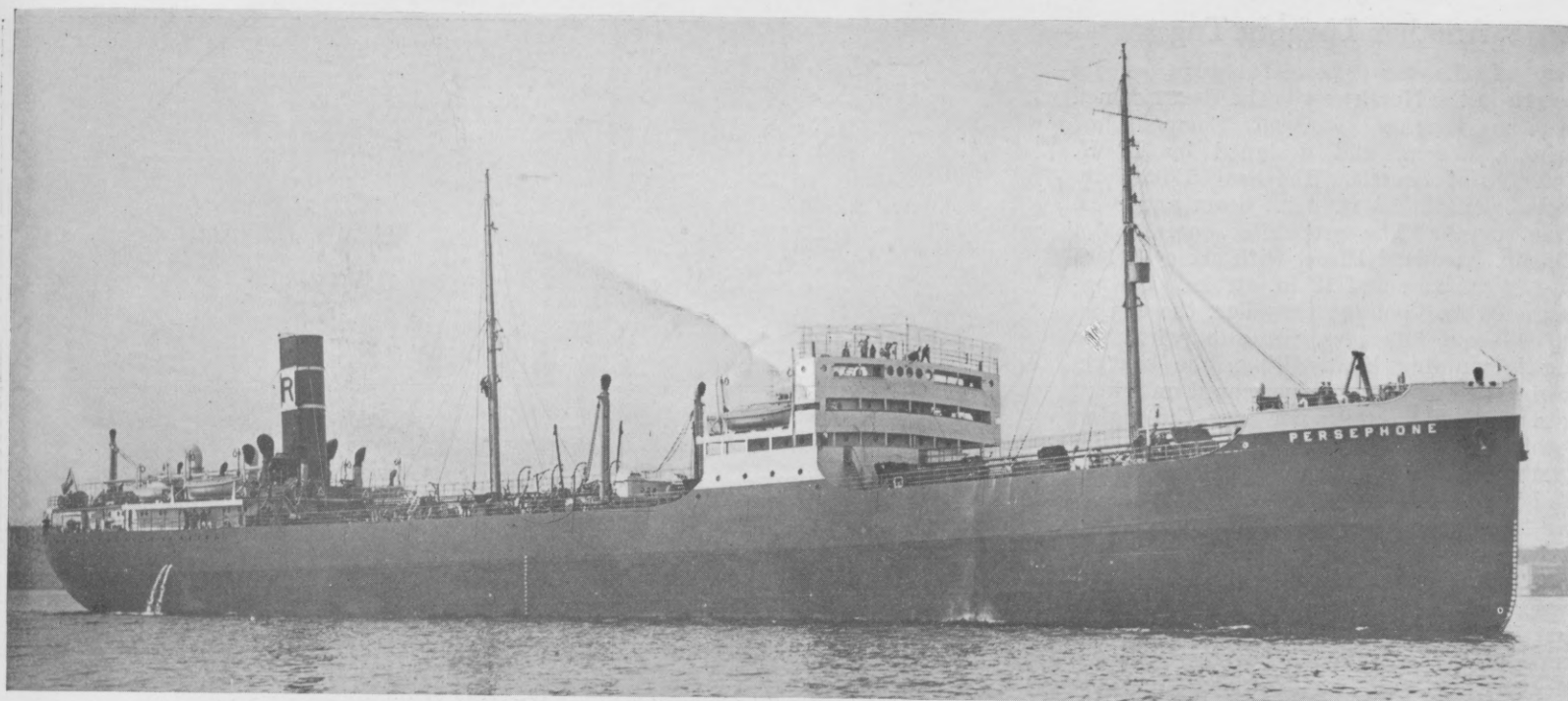
### Meetings for Marine Week

Fourteen societies connected with marine activities have planned to convene in New York during Marine Week, November 9-14. Plans are being made to hold one joint meeting of all the societies during the week, in addition to the individual meetings of the following:

- American Institute of Electrical Engineers (Marine Committee).
- United States Naval Institute.
- American Marine Standardization Committee.
- Neptune Association.
- Propeller Club.
- Port of New York Authority.
- Society of Naval Architects & Marine Engineers.
- American Society of Marine Designers.
- Marine Engineers Beneficial Association.
- United States Ship Operators' Association.
- American Bureau of Shipping.
- Council of American Shipbuilders.
- Ocean Asso. of Marine Engineers.
- Maritime Association of Port of New York.
- New York Tow Boat Exchange.
- American Marine Association.



*Fruit carrier that operates out of Benton, Mich.*



*New twin-screw tanker of about 12,000 tons deadweight capacity propelled by Diesel engines of 3200 s.h.p.*

### Big Motor Tanker

A tank vessel of 12,000 tons d.w. capacity was completed recently at the Krupp yards in Germany for the Deutsch-Amerikanische Petroleum Ges. She measures 450 ft. in length b.p., has a molded breadth of 63 ft., a molded depth of 35 ft. 6 in. to the shelter deck, and has a gross registered tonnage of 8,955 tons. Each of her twin screws is driven by a 4-cylinder 2-cycle Krupp engine of 1600 s.h.p. turning at 90 r.p.m. Like many of the other big motor tankers now under construction in that yard, she is engaged in the transportation of oil from the United States to other countries and is under the control of American capital invested abroad for the development of trade.

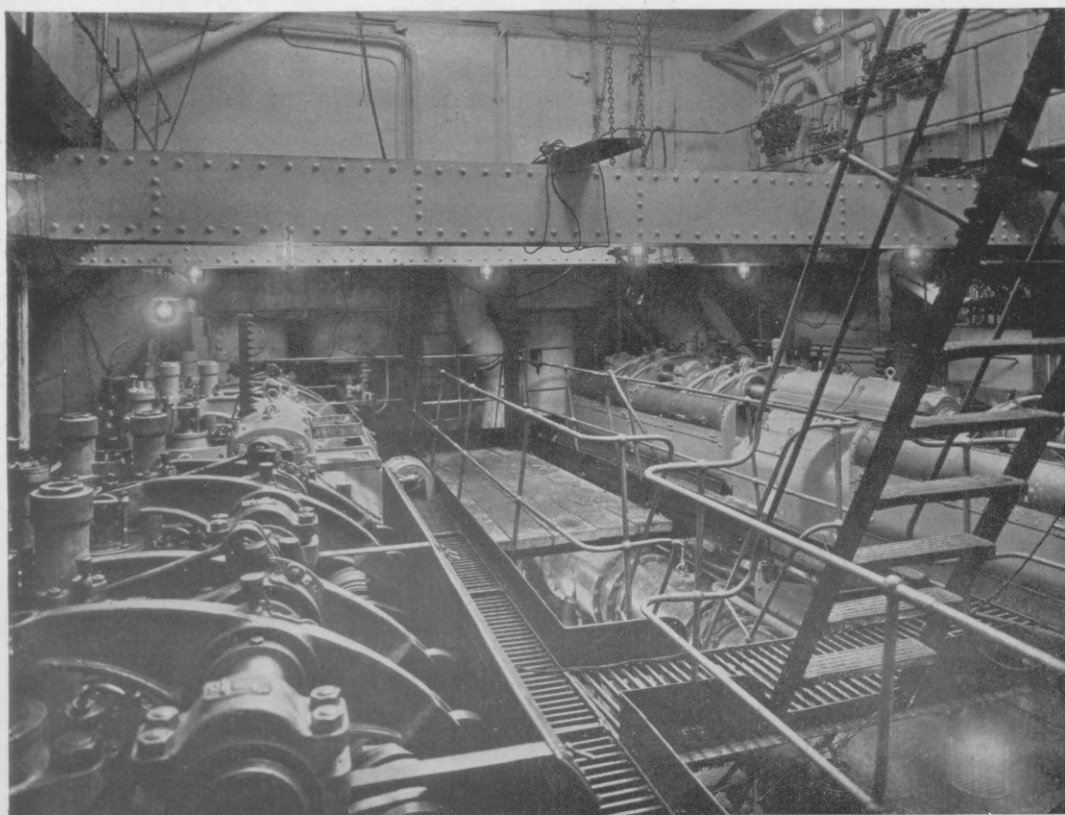
### A Thrifty Conversion

A very successful conversion has recently been carried out by the Standard Transportation Co., which handles the bulk shipments of the products of the Standard Oil Co. of New York in the Eastern States. This company has put into service during the last two years nine Diesel-engined tank barges of about 2,000 tons d.w. capacity, built for coastwise service and for operation on the New York State Barge Canal. They have also a number of gasoline engined barges, some of which, as for instance the SOCONY 5, SOCONY 6 and SOCONY 62 were already converted to oil engines before the fleet of Diesel engined barges was built in 1923 and 1924. Early this year the Standard Transportation Com-

pany decided to take out the gasoline engine from the ROCHESTER SOCONY and replace it by an oil engine. The boat was originally built in 1920 with a registered length of 148.7 ft., breadth 28.4 ft. and depth 11.8 ft. About two years ago she was cut in two, and 40 ft. added to her length without reducing her speed while at the same time considerably improving her handling ability. The gas engine developed 300 hp. at 400 r.p.m. On the original bed, and with the same tailshaft and propeller, a 200 b.h.p. 2-cycle Worthington oil engine has been installed. This engine has four cylinders of 12½ in. diameter and 13¼ in. stroke. To enable it to clear the keelson the Worthington Co. slightly altered the bedplate casting. The conversion has, therefore, entailed no more work than the installation of a new engine, of a new tank and of a new muffler. All the original auxiliaries have been retained. The boat makes a mean speed of 7¼ miles per hour, which is equal to 6.3 knots. As she is a canal barge she will be capable of doing about the same amount of work during the season with her 200 b.h.p. oil engine as she was capable of doing with her 300 hp. gas engine.

With the completion of the motorship AGRA built for the Swedish East Asiatic Company of Gothenburg, the Gotaverken finished their 25th ocean-going motorvessel. This ship has an overall length of 390 ft. and a deadweight capacity of 7,500 tons. The twin screws are driven by Gotaverken long-stroke Diesel engines of the new B. & W. light design, aggregating 2550 s.h.p. and driving the ship at 12½ knots.

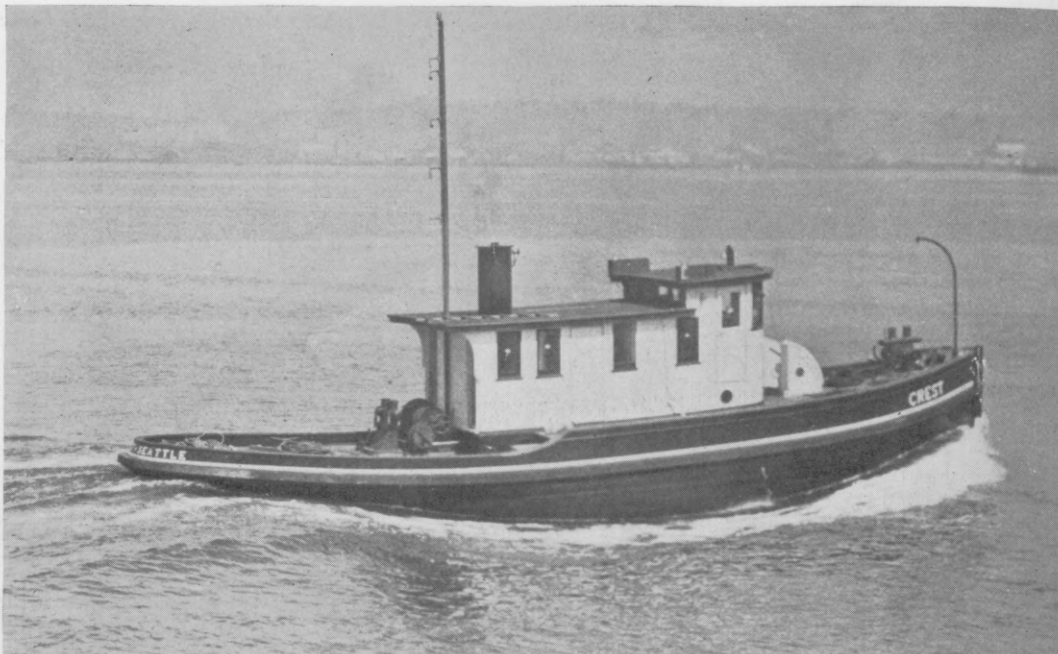
A greater tankship tonnage is owned by the United States than by any other nation in the world. There are 402 tankships under the American flag with a gross tonnage exceeding 2,500,000. This represents 45 per cent of the gross tonnage and 39 per cent of the total tankers in the world. Great Britain is second, with 36 per cent of the gross tonnage and 38 per cent of the ships, the British vessels numbering 391 and slightly in excess of 2,000,000 gross.



*View on upper grating of engine-room of tanker Persephone*

### Another Logging Tug

One of the most powerful tugs of its length in the Northwest is the CREST owned by the Wagner Towboat Company of Seattle, Wash., and designed by L. H. Coolidge of Seattle. She has 55 ft. 6 in. overall length, 13 ft. 4 in. beam and 8 ft. 2 in. depth. The propelling engine is a 135 hp. Standard Diesel with six cylinders of 8½ in. bore and 12 in. stroke. Swinging a 58 in. Coolidge propeller, the engine turns about 380 revs. per min. when the tug is running light. When the boat is towing logs, which can be moved only at a rate of about 1½ miles per hour, the engine revolutions are lower. As soon as the CREST was put into service she was scheduled to operate about 18 hours a day, towing logs on Puget Sound most of the time. A report made about two weeks after the boat had been commissioned stated that the owners were so pleased with the machine that they expected to buy a more powerful engine of the same make for conversion of one of their steam towboats. Like many of the tugs in the Northwest the CREST is equipped with a power driven towing machine for taking in the tow line when the boat and tow are under way. When the drawbar pull was measured at the dock the figure recorded was 5600 lb. at 362 engine revolutions.



*Crest, one of the smaller logging towboats of the Puget Sound fleet*

### Italian Standard Motorships

Four standard motorships are being built for different companies at the Cantiere Navale Triestino at Monfalcone, Italy. These are all vessels of about 8000 tons d.w., to be equipped with a single screw Diesel engine of 1950 s.h.p. expected to drive the vessel at a speed of 10½ knots. These ships differ only slightly in equipment and in the auxiliary deck machinery, to meet the particular requirements of the different owners. They will have the following principal dimensions:

Length b.p.....	400 ft.	0 in.
Breadth, extreme.....	53 ft.	0 in.
Depth, molded.....	27 ft.	10 in.
Draft, summer free board.	24 ft.	0 in.

The engines will be built at the Stabilimento Tecnico Triestino and will be of the Burmeister & Wain type with six cylinders of 29.13 in. diameter and a stroke of 59 in., the engines turning at 95 r.p.m. For driving the generator sets there will be in each ship three 2-cylinder engines developing 100 hp. at 400 r.p.m. and direct connected with 66 kw. 220-volt dynamos. All machinery throughout the vessels will be electrically driven. On deck there will be five winches of 5 tons capacity and eight of 3 tons. Two of the ships have been ordered by the Navigazione Generale Gerolimich & Co., of Trieste; one has been ordered by the Navigazione a Vapore L. Premuda, Trieste, and the fourth by the Societa Veneziana di Navigazione a Vapore of Venice.

VIMINALE, the first of the combined freight and passenger motor vessels for the Far Eastern service of the Lloyd Triestino, is expected to sail on her maiden voyage this month. She is a vessel of 450 ft. length, 57 ft. beam and 35 ft. depth, measuring 9120 tons gross and driven by two Diesel engines developing an aggregate of 3000 s.h.p. with supercharging. This machin-

ery has been built at the Stabilimento Tecnico Triestino, which also built the ship at its San Rocco yard. Passenger accommodation comprises single-berth and double-berth cabins for 40 passengers.

For the new service between Pacific Coast ports and the Mediterranean the first of the four motorships building for the Navigazione Libera Triestino is nearly completed. She has been named the FELLA. Built and engined by the Stabilimento Tecnico Triestino, she is 430 ft. in length b.p., 55.2 ft. in breadth and 30.2 ft. in depth with a carrying capacity of 9900 tons. Her propelling machinery consists of a single 6-cylinder engine (29.13 in. x 59.00 in.) to develop about 2400 s.h.p. with supercharging at 95 r.p.m.

In the double-acting engines now being built by Harland & Wolff and by Burmeister & Wain a piston speed of about 1230 ft. per min. is being used. There is also a tendency to go to higher piston speeds on the single-acting engines. One of the standard Harland & Wolff 8-cylinder engines of 29.13 in. diameter and 59.06 in. stroke is being arranged to turn at 100 r.p.m., which means a piston speed approaching 1000 ft. per min.

### Clear View Screens

A polished glass disc, rotated by an electric motor at such a speed that rain, spray or snow are prevented from collecting on it, is one of the most modern additions to the navigating bridge. This device maintains a clear transparent surface under all weather conditions. It is known as Kent's Clear View Screen, and the exclusive manufacturing and selling rights for the United States and Canada have been secured by Chas. Cory & Sons of New York. The complete instrument is offered in two standard forms. The simplest type is mounted in a polished teak frame to take the place of an existing window in the wheelhouse or wing shelter. The second type is mounted in a hood that revolves on a pedestal, and is suitable for installation in an exposed position.

A new motorship order has been taken by the Chantier et Ateliers de St. Nazaire Penhoët. She is to the order of Fred Olson of Oslo and will be a twin screw vessel of about 11,000 tons deadweight to operate between Norway and San Francisco, Cal. She will be about 445 ft. in length and about 60 ft. in breadth, with Burmeister & Wain engines of about 4500 s.h.p. built at the Penhoët plant. She is expected to have a speed of about 13½ knots. A large refrigerating space will be provided, and there will be accommodation for a limited number of first class passengers.

### Palmer Outlines Program

For dealing with the problem of American shipping the president of the Emergency Fleet Corporation enunciated the following program in his speech before the National Foreign Trade Convention at Seattle last month:

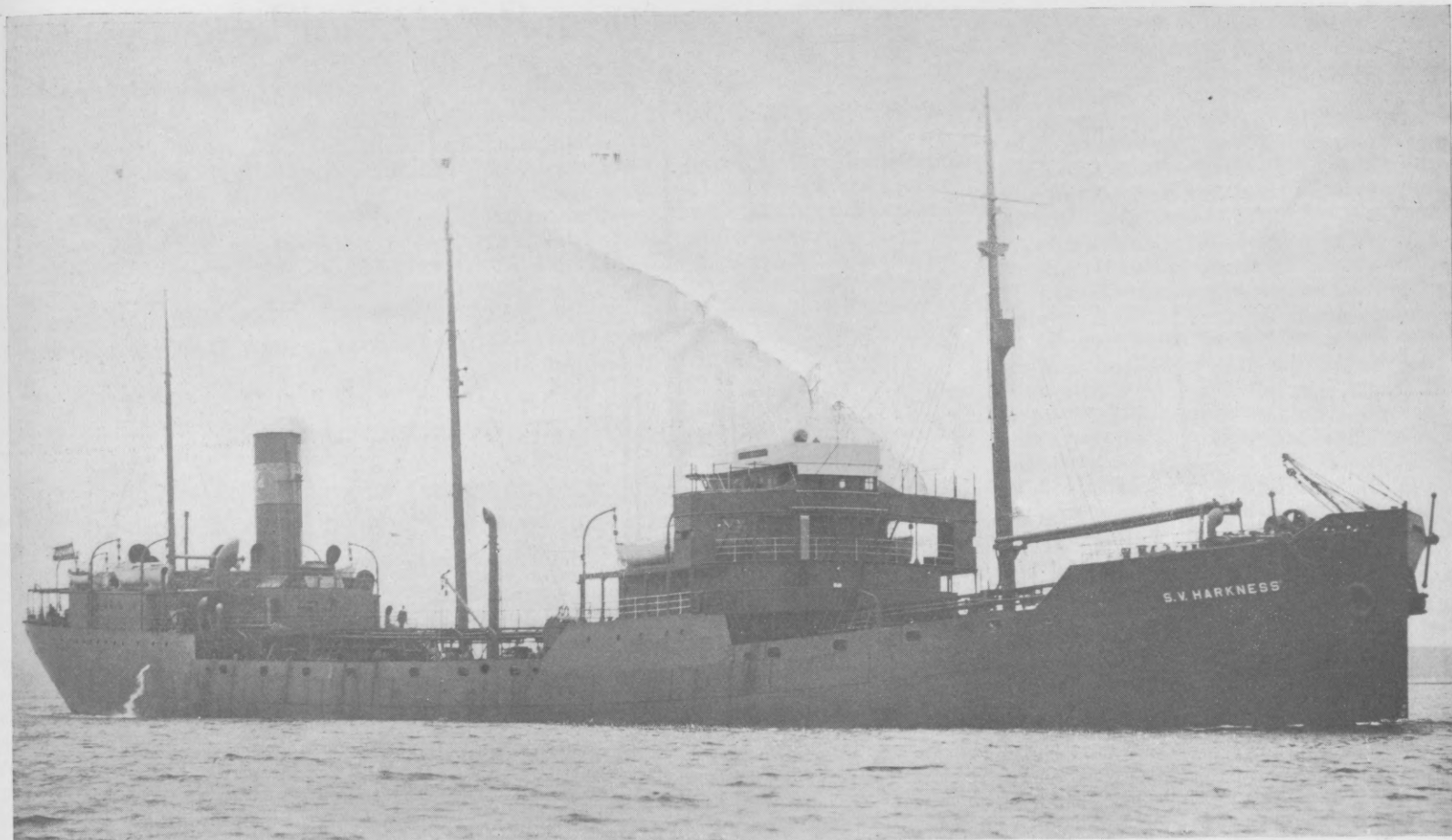
(a) An aggressive and well thought out plan to transfer the government ships to private ownership on terms that include the government interests and at the same time give the buyer an opportunity for profit that will insure his continuance indefinitely in the trade.

(b) Continuance of the operation of government lines on such of the trade routes as are considered economically essential to the national interests and which cannot be disposed of to private operators.

(c) Continued improvement of these lines until they show the best economic results obtainable under government operating conditions, thereby reducing the present operating loss by half.

(d) On most heavily losing routes, the maintenance of only such services as may suffice to hold position in the trade and to conserve our national trade interests, but, on the more promising routes for expansion of the services to meet the demands and prospects of the national trade.

(e) Where sales are impossible, the charter of the lines to private responsible operators, if practicable, on terms that will be advantageous to the government and that will give the operator an opportunity to become eventually an owner.



*A Skinner & Eddy built tanker of 9590 tons d.w.c. converted from turbine propulsion to Diesel power*

### Conversion of Big Tanker

In the conversion of the S. V. HARKNESS from turbine propulsion to Diesel power, not only was a great reduction obtained in the daily fuel consumption, but the speed has been increased about three-quarters of a knot. The S. V. HARKNESS was built by Skinner & Eddy of Seattle in 1917. She is a vessel of 6899 tons gross and 9590 tons d.w. Her registered dimensions are 419.4 ft. by 57.2 ft. by 29.8 ft., and she is owned by the Baltisch-Americanische Petroleum Import G.m.b.H., for whom she is engaged in carrying American oil to the Baltic countries of Europe.

The steam turbine installation was supposed to give her 2500 s.hp., but there seems some reason to doubt that she used to get the power, because as a steamer she averaged only 10 knots, whereas with her new Diesel engine of 2400 s.hp. she is capable of averaging 10¾ knots. As a steamer this vessel had a daily fuel consumption of between 32 and 33 tons, which has been cut to 11 tons with the oil engine.

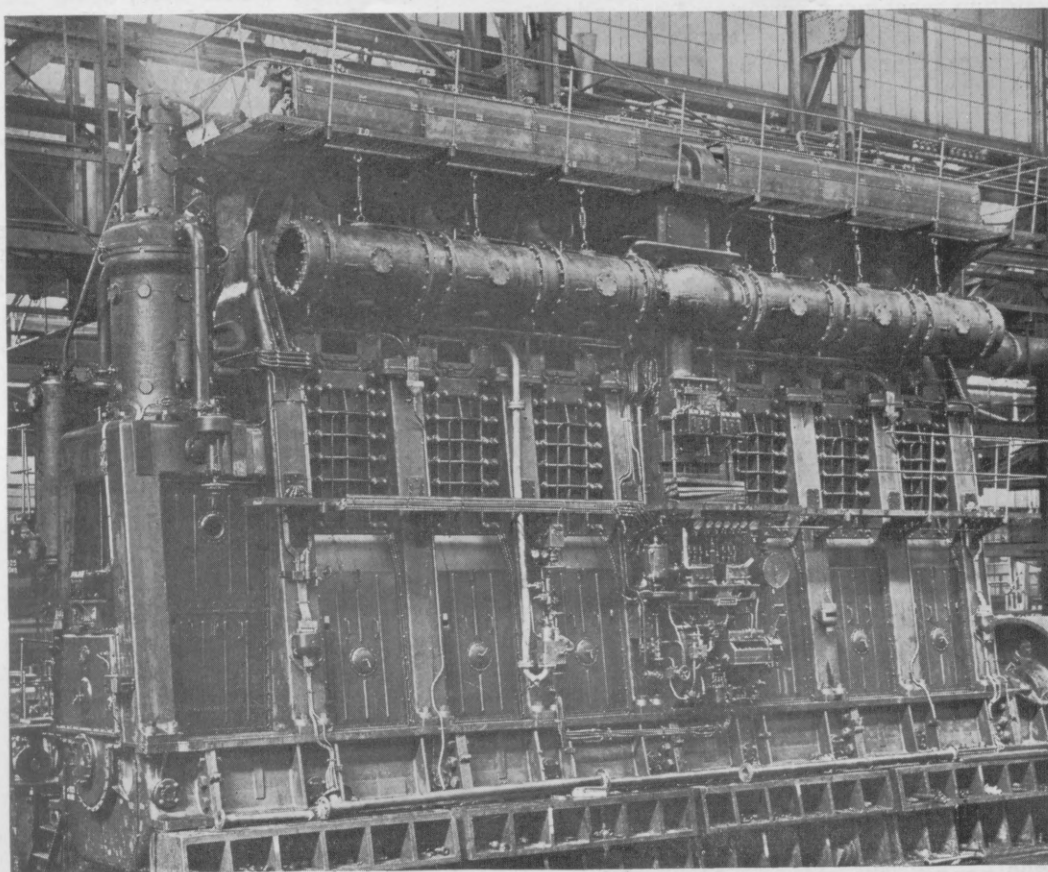
In the process of conversion no change has been made from the single screw, the turbine having been replaced by a 6-cylinder 2-cycle Krupp set which develops 2400 s.hp. at 90 r.p.m. A cross section through the cylinder of this type of engine is given on page 528 of this issue, and reference is made there to some of the most distinctive features of the design.

A consequence of the reports of the splendid results obtained by the conversion of the S. V. HARKNESS, a tankship owned by the Baltisch Americanische Petroleum Import G.m.b.H. was the rumor that the Standard Oil Co. of N. J. was considering the advisability of converting five more of

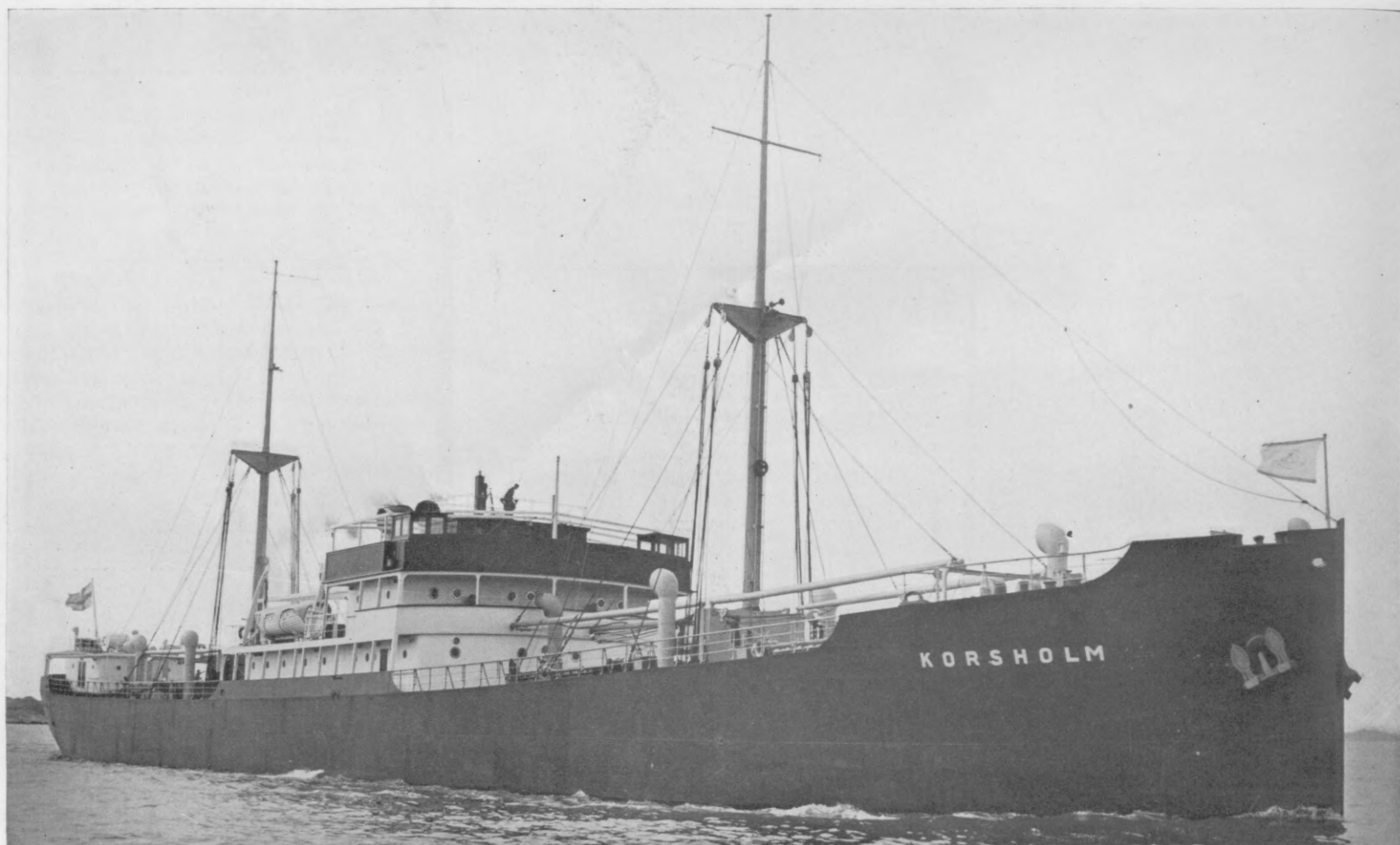
its steam tankers to Diesel power. There is no foundation for the rumor, which possibly arose from confusion over the number of steamers now being converted for some of the Standard's foreign subsidiaries.

A contract has been placed for the conversion to Diesel propulsion of the steamship VISTULA, 13,885 d.w. tons owned by

the Baltisch Americanische Petroleum Import G.m.b.H. This work will be done at the yard of the A. G. Weser at Bremen, where two single-acting 2-cycle 4-cylinder 1500 b.hp. Krupp engines will be installed to give the vessel a speed of 11 knots. Consideration is also being given to a similar conversion of practically a sister ship, the s.s. BALTIC.



*Six cylinder two-cycle 2400 s.hp. engine of S. V. Harkness*



*New Swedish-American Line single-screw freighter of 5100 tons deadweight capacity and 1600 s.h.p.*

### New Swedish-American Freighter

For the Swedish-American Line of Gothenburg a motorvessel of 5100 tons d.w.c. was recently completed by the Götaverken. She is a vessel of 327.6 ft. length b.p., 45.5 ft. molded breadth and 22.9 ft. molded depth to the main deck. Her propelling machinery consists of a 6-cylinder long stroke Diesel engine with cylinders of 24.8 in. diameter and 51.25 in. stroke, fitted with a supercharger, the first that has been installed on any Swedish motorship. For the electrical supply there are three Diesel engine generator sets of 66 kw. each, and all auxiliary machinery throughout the vessel is electrically operated. On trial, loaded down to a draft of 21 ft. corresponding to 5030 tons d.w., with a total displacement of 7050 tons, the KORSHOLM made a speed of 10.95 knots with the engines turning at 106 r.p.m. and developing 2115 hp.

### A Spanish Conversion

Owing to the success of the conversion to Diesel power of its steamer J. J. SISTER, the Compania Transmediterranea of Valencia, Spain, undertook the conversion of another of its passenger steamers the V. PUCHOL. This vessel was built in Italy in 1896 and is 283.3 ft. long by 36.9 ft. breadth and 18.7 depth, measuring 1514 tons gross. As in the first vessel converted by this company, the new propelling machinery consists of two 10-cylinder engines of the M. A. N. trunk piston type with cylinders of 20.88 in. diameter and 20.88 in. stroke developing 1400 s.h.p. each at 200 r.m.p. The ship should run trials next month.

One of the first big shipping companies to adopt motorvessels, the A. B. Nordstjernan Rederi of Stockholm, recently took delivery of a new motorship SANTOS built for them by Kockums Mek Verkstad. She is a vessel of about 6500 tons d.w. measuring 367 ft. in length b.p., 51 ft. 4 in. beam and 34 ft. in depth to the shelter deck, about the same size as the SUECIA which was the first motorship owned by this company and built in 1912. The latest vessel is driven by two M. A. N. engines built by Kockums. All the auxiliary machinery is electrical.

A saving of fully 10 per cent in weight has been achieved by the use of a new steel in the construction of the hull of the twin-screw oil-engined vessel PROMETHEUS which is now being completed for the Far Eastern service of the Blue Funnel Line (Holt & Co.) of Liverpool. The material was developed through the efforts of F. G. Martin, metallurgist to the owners, and has been accepted by Lloyds. Since the Isherwood system of construction was introduced this is the first notable effort made to increase the efficiency of a hull as a carrier by reducing the weight.

Particular interest attaches to the motorvessel SORRENTO recently delivered to R. M. Sloman, Jr. of Hamburg, by the Weser Shipyard, on account of the fact that a similar vessel is to be built with a Flettner rotor for the purpose of comparison as reported in last month's issue. This ship has a deadweight capacity of about 3,000 tons, being 279 ft. long by 41 ft. 6 in. beam and 18 ft. 10 in. depth. The engine is of the 4-cycle M. A. N. type built at the Weser plant and drives the boat at a speed of about 10 knots.

### Large Refrigerator Vessel

In the new twin screw motorvessel PORT DUNEDIN there is stated to be a larger refrigerating space than in any motorvessel yet built. She is for the chilled meat trade between New Zealand, Australia and the United Kingdom. Like many of the bigger vessels fitted with refrigeration, PORT DUNEDIN was built by Workman, Clark & Co. of Belfast. She belongs to the Commonwealth & Dominion Line, and is 455 ft. long between perpendiculars, 59 ft. 6 in. wide and 43 ft. 9 in. deep to the shelter deck. Three of the five large holds and the tween decks are for refrigerated cargo, and fan rooms have been fitted in order that fruit cargoes also may be carried. Her main propelling machinery consists of two sets of 4-cylinder Doxford engines developing about 2100 s.h.p. each at 95 r.p.m., and there are three 4-cylinder Diesel driven generating sets supplying power for auxiliary purposes.

With the launching of the WEIRBANK at the Harland & Wolff yard in Belfast last month there remain only two hulls to be launched out of the order of 21 motorships placed by the Bank Line with that shipbuilding firm.

Another Bank Line vessel, the FORREBANK of 5200 tons gross, was delivered last month to Andrew Weir & Co. by Harland & Wolff. She is a cargo vessel of the shelter deck type similar in dimensions and design to the other vessels recently delivered to the same owners. She is propelled by two sets of 6-cylinder Harland & Wolff engines and all her auxiliary equipment is electrically operated.

## —Financial Reports—

### American Hawaiian Steamship Co.

Operating losses, after depreciation, of \$789,367 were shown by the American Hawaiian S.S. Co. in the report for the year ended December 31, 1924. The gross earnings for the year were \$2,877,173, compared with operating and general expenses of \$3,686,540. The surplus is \$6,746,819 and cash on hand was \$1,176,666. The company discontinued the dividend of 6 per cent which had been paid out of surplus and accumulated profits during the last few years.

### Todd Shipyards Corp.

Net profits of the Todd Shipyards Corp. for the year ended March 31, 1925, amounted to \$226,535 after deducting interest and depreciation, but before allowing for Federal taxes. This was equivalent to \$1.07 a share on 210,394 shares of no par capital stock. The previous year the net profits were \$713,175 or \$3.39 a share. The assets totaled \$22,850,499, including \$2,583,494 cash and \$3,127,334 of accounts and notes receivable, in addition to \$2,876,343 of marketable securities. The property account showed \$11,307,425. Accounts payable were only \$1,058,164 and the reserve for taxes and contingencies was \$5,532,604. Total current assets were \$11,345,694 so that with the current liabilities shown, there is a net working capital of \$10,287,530. A dividend of \$1.00 a share has been declared, which is a reduction of 50 cents a share from the previous rate.

### International Mercantile Marine Company

In the report of the International Mercantile Marine Company and subsidiaries for the year ended December 31, 1924, the net earnings including insurance fund surplus for 1924 and after deduction of operating and general expenses, taxes and interest on debenture bonds of subsidiary companies, were \$6,875,834. After payment of \$2,198,931 interest on I.M.M. bonds and writing off \$5,756,207 depreciation on the steamers, there was a deficit of \$1,079,304. P. A. S. Franklin, the president, stated that the outlook was not very bright for the lines in this combine. No other business, he stated, has experienced a like reduction in the amount of traffic as the transatlantic passenger business has done, due to the new immigration laws.

### Westinghouse Electric & Manufacturing Company

In the report of the operations of the Westinghouse Electric & Manufacturing Company for the fiscal year ended March 31, 1925, the gross earnings were \$157,880,292, on which a net manufacturing profit was shown of \$13,638,227. Other income amounted to \$4,203,179, making a gross income from all sources of \$17,841,406. After payment of interest charges the net income available for dividends and other purposes was \$15,324,364. For the fiscal year ended March 31, 1924 the net income had been \$16,125,303. The surplus as of March 31, 1925 was \$51,199,324.

### Pacific Mail Steamship Company

Stockholders of the Pacific Mail S.S. Co. have ratified the sale to W. R. Grace & Co. of the steamers they had in the intercoastal passenger trade, of two freighters and of the motorships CITY OF SAN FRANCISCO and CITY OF PANAMA which were operating in the West Coast-Panama trade. These seven ships were valued at \$2,145,000 and will be operated by the Panama Mail Steamship Co., newly organized by W. R. Grace & Co. with headquarters in San Francisco.

### Canadian Government Merchant Marine, Ltd.

In the report for the year 1924 there was shown an operating loss of \$1,440,880, compared with an operating loss of \$1,864,293 for 1923. The fleet consists of 57 vessels with a total deadweight capacity of 353,450 tons, carried on the books as worth \$62,061,387 on December 31, 1924, equal to \$176 per deadweight ton, which is of course, an absurd figure. Total interest on notes due the Dominion Government amounted to nearly \$16,000,000 at the end of 1924. The rate at which money is being lost by the venture shows in the statement that the deficit for 1924, including depreciation and interest charges, was about \$9,000,000.

### N. V. Werkspoor, Amsterdam

In its report for the year ended December 31, 1924 the Werkspoor Company, of Amsterdam, showed an operating gross profit of \$587,680 prior to depreciation and cost of welfare work. With the surplus from the previous year and other income the total gross was \$693,868 and the net was \$283,417. Outstanding capital amounts to \$4,050,000, and there are outstanding bonds to the value of \$460,000. A dividend of 6½ per cent has been paid on the common stock, compared with 5½ per cent the previous year. During the year the Amsterdam works were run to capacity.

### Chantier et Ateliers de Saint Nazaire Penhoët

For the year 1924 the Chantier et Ateliers de Saint Nazaire Penhoët showed a net profit of \$71,571. A dividend of 6 per cent has been paid. The firm has 17 vessels under construction aggregating 101,000 tons and 300,000 hp., most of which are foreign orders and of which five are motorships.

### Royal Mail Steam Packet Company

Although the fleet of this company consists of 51 vessels of 409,686 tons gross, the fleets of the other companies affiliated with

the same management represent a gross register of 1,688,121 tons, making a total of 2,097,807 tons gross. It is only with the operation of the vessels under the R.M.S.P. flag that this review deals. They include at present only three motorships, the LOCHGOIL, LOCHKATRINE and LOCHMONAR, each of about 9400 tons gross, but the company has placed orders for two twin-screw mail and passenger vessels of 22,000 tons gross and with double-acting engines of about 15,000 s.hp. The first of these big boats will be called the ASTURIAS and will be launched at Harland & Wolff's probably this month. She is expected to be in service early next year and her sister ship will follow about six months later. For the year ended December 31, 1924, the net earnings amounted to about \$3,890,000 after providing for depreciation and taxation. To this must be added about \$626,600 available from the previous year. A dividend of 6 per cent for the year was paid on the common stock and after payment of dividends on the preferred stock and on the debenture stock, there was a balance of about \$675,000 in the profit and loss account.

### Kokusai Kisen Kabushiki Kaisha

Typical of the losses suffered by some of the Japanese shipping companies that acquired tonnage at boom prices is the experience of the K.K.K. Line. This is the largest Japanese freight line, with steamers aggregating about 470,000 tons d.w., standing in the books at a value of about \$57,823,000, equal to about \$123 per d.w. ton. The balance sheet for the year ending December 31, 1924 shows bank loans, special loans and debentures amounting to \$33,800,000, which represents \$72 per ton. There is no steam fleet in the world worth this price, and it is clear therefore that not only have the original stockholders lost their entire investment, but the debenture holders probably are in a little less favorable position. The loss on 1924 operations was about \$2,800,000.

### Burmeister & Wain, Ltd.

An issue of 15-year 6 per cent gold bonds of Burmeister & Wain Ltd. of Copenhagen has just been made in this country by Brown Bros. & Co., Blair & Co. Inc., and White Weld & Co. The proceeds will be used to increase the working capital of the company, which has orders on hand to keep its plants fully occupied on three shifts daily for the next 18 months. The bonds were issued at 95¼ and will yield 6½ per cent. They will rank equally with \$807,500 of 5 per cent outstanding bonds of the company previously issued in Denmark. Except for \$243,907 mortgages the properties of the company are entirely free from mortgage lien. The earnings of Burmeister & Wain Ltd. for the last five years have been:

YEAR ENDED DECEMBER 31ST	1920	1921	1922	1923	1924
Net income from operations, royalties, etc. ....	\$2,012,239	\$1,529,184	\$475,278	\$623,842	\$760,837
Reserves for depreciation, taxes, etc. ....	671,950	489,462	226,078	131,336	261,279
Balance applicable to interest ....	1,340,289	1,039,722	249,200	492,506	499,558
Interest .....	65,910	166,106	125,009	67,988	152,050
Surplus for year .....	1,274,379	873,616	124,191	424,518	347,508

# MOTORSHIP

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Readers are invited by the Editor to submit articles, photographs or drawings relating to motorships, marine oil engines or auxiliaries. Contributions used in the magazine are paid for on the 15th of the title month of issue, and other contributions are returned as promptly as possible.

## Pacific Coast Is Again Pioneering in Motorvessels

AT the present time the most powerful motortug built in the United States, the largest motordredge in the world and the two biggest motor ferryboats in the country all stand to the credit of builders on the Pacific Coast. The States of Washington and Oregon have again assumed the lead in motorship matters which they held in the years up to, and including, the war. It was on Puget Sound that the first satisfactory marine oil engine installations in this country were made. As a matter of fact, the first actual installations of marine oil engines were made just about contemporaneously on the East Coast and on the West Coast, but, whereas the first troubles encountered with the eastern installations practically halted marine oil engine progress on the Atlantic Coast, the pioneers on the Pacific Coast made light of their early troubles and went ahead.

In the East the supply of cheap coal favored the retention of the steamer habit. In the West the absence of good coal favored power installations consuming oil fuel, and it was a natural tendency to favor the power plant that would consume that fuel most economically. In all respects the marine oil engine was just as suitable to conditions in the East as in the West, offering the same advantages and possessing the same superiority, but people in the East were not so ready to accept it.

The manner in which the shipowners and boatowners of California, Oregon and Washington took up the oil engine for their local needs, for the vessels in the Alaskan trade and for the larger ships which the suddenly increased demand throughout the world for more tonnage caused to be built,

started the marine oil engine movement in this country soundly on its way.

Following the war the West Coast lost its lead. The East Coast began to do bigger things, built bigger motorships than had been built in the West and took the first steps towards the modernization of its fleet of fishing boats, harbor boats and sea-going vessels which has now assumed very big proportions. For a time the more spectacular character of this work overshadowed the steady progress of the marine oil engine in Pacific Coast waters. The movement in the West was never arrested. It made steady progress, and the marine oil engine was long ago accepted there as the only real power for boats in these days, although in the East, the majority opinion still leans towards the old steam power.

This year however, the West has moved to bigger endeavors. It is pioneering the way to more powerful tugs, more powerful dredges and more powerful ferryboats, utilizing in those classes of vessels powers bigger than have yet been adopted for such purposes in any part of the country. The stimulus of this progressive spirit will undoubtedly be felt all over the country and will be an added incentive to the owners of towboats in the East, most of whom now recognize that they can no longer afford to operate with steam when they can operate so much more economically with oil engine power. The dredge owners on the Atlantic and Gulf Coasts are all turning to the oil engine. The small ferryboat owners build no more steamers but the ponderously conservative owners of big ferryboats, like city corporations and railroad companies, have not yet seen the foolishness of investing money in steam ferries at a time when that class of boat has already entered its decline. The West does its pioneering and the East follows in its own good time.

## Material Encouragement for American Shipbuilding

IT has been perfectly natural that with the great fleet of ships and huge tonnage under national ownership, the desire to encourage American shipping should have first sought only means to make shipping an attractive investment. All talk of national aid for the American Merchant Marine has since the war been directed to the outpouring of money in support of private ownership and operation of vessels. Seven years have passed since the need for ships was vital, and in these seven years means have been sought to relieve the nation from the burden of keeping a large proportion of its tonnage in cold storage and in finding use for the ships in such a way that they would be available again in time of national emergency.

The fleet has been growing old, and it will grow much older before a satisfactory solution of the problem is found, assuming even that a complete solution can ever be agreed upon by the conflicting interests of business and of politics. It would help little if a solution were found only by the time that the fleet is obsolete and unfit for service, and no shipyards in the country capable of replacing the tonnage in quick time and at a normal cost.

It is wise that the nation should give thought to the establishment of American shipbuilding on a secure and permanent basis. The hazards of the shipbuilding in-

dustry in the United States are far too great at the present day to meet the essential requirements of sound business. Its ups and downs always have been greater than in other countries. This is one of the greatest handicaps to American shipping. Every effort should be made to remove it. One of the most constructive proposals yet put forward has been urged by F. P. Palen, whose plan is explained on another page. Those who are associated with the marine industry should not spend any effort in criticizing these proposals, but should apply themselves to the thought of improving them or replacing them by a better plan. There are plenty who are ready to tear down the shipbuilding industry, and they ought not to find support from within the industry. There is not necessarily any finality in the Palen proposals, but they set a lead and encourage constructive thinking.

Under a plan which has many points in common with the one urged by F. P. Palen the British are now building some of the largest motorliners in the world. This is being done under the terms of the so-called Trade Facilities Act, which is apparently sufficiently broad in its scope to permit the government to assist any branch of business but has been of greater service to the British shipbuilding industry than to any other branch of trade. The help being given by the British government at this time to its shipbuilders in this way does not seem to be sufficiently recognized or well enough known in this country. A similar plan was followed when England built the MAURETANIA and LUSITANIA, the government in that case advancing the money to the Cunard Company at a rate of interest no higher than 2¾ per cent. Without that loan of cheap money to the Cunard Co. the British shipbuilding industry would never have had the benefit of constructing those two big fast liners.

England is not alone in following this policy. Other countries do it. Sweden has had a governmental fund for loans to shipowners for a number of years. Italy is following a similar policy on such a large scale today that Italian shipbuilding has risen to the importance of a major industry in that country. France and Japan have pursued a similar course. France with its lack of maritime sense has not benefited greatly thereby, but Japanese shipowners have profited to a very wide extent and thereby a great shipbuilding industry has been built up in those islands of the East. These instances of the benefits of policies similar in many respects to that suggested by Mr. Palen should afford encouragement in the acceptance of the principles incorporated in his proposals.

## Clear Thinking Needed About Merchant Marine

IN the editorial which appeared last month on this subject, the meaning of one sentence was altered from its original intent through the inadvertent omission of the word "not." Our way of thinking appeared so clearly from the context that there is little likelihood any readers were misled by the omission. The particular sentence to which reference is made should have read: "It is also unwise for shipowners not to declare against the repeal of the 50 per cent duty on repairs to American ships in foreign yards."

# Motorliner of 31,000 Tons Ordered By N. G. I.

Transatlantic Passenger Ship Will Have Diesel Engines of 27,000 s.hp. and Speed of 23 Knots.

AN order for a large passenger motor-ship of 31,000 tons has been placed by the Navigazione Generale Italiana with the Ansaldo yard at Sestri Ponente, Italy. In MOTORSIP of May, 1925 announcement was made that such an order was about to be signed, and the confirmation has now been obtained.

Our Genoa correspondent states that this vessel will be 760 ft. long and will be designed for a speed of 23 knots. She will have accommodation for 300 first-class passengers, 370 second class and 900 third class.

Most likely the propelling sets will be of the M. A. N. type built by the Cantiere Officine Savoia at Cornigliano Ligure, but no definite decision has yet been made. There is a possibility that the order for the machinery will be entrusted to the Fiat Company in Turin.

This ship, which will be named ITALIA and not FIRENZE as first reported, must not

be confused with the 26,000 tons motorliner which the Navigazione Generale Italiana has in many quarters been reported to have ordered from Germany. The basis for that report was probably that this Italian line at one time considered the advisability of having such a vessel built in Germany on Reparations Account through the intervention of the Italian government. In view of the support Premier Mussolini is now giving both to Italian shipbuilding and Italian shipping, there was never any great likelihood that he would consent to such a course.

The Navigazione Generale Italiana is reported to have decided upon the construction of two more motorliners, which will be of 24,000 tons each and will be named ANDREA DORIA and CONTE CAMILLO DI CAVOUR respectively. One of these will probably be entrusted to the Ansaldo firm and the other in all likelihood to the Cantiere Fiat San Giorgio at Muggiano (La

Spezia). The latter will almost certainly be equipped with Fiat engines, while the former might have M. A. N. type engines built by the Savoia concern.

In explanation of the association of the Fiat name with the contracts for the machinery on these three vessels, it may be stated that the Fiat works in Turin are designing a double-acting 2-cycle engine with cylinders of 2,000 hp. each, so that an aggregate of 16,000 hp. could be obtained from 4-cylinder sets driving twin screws. This engine is reported to measure less than 30 ft. in height, which is about 25 to 30 per cent less than the double-acting engines of approximately the same power being built in other countries. In Turin it is reported that the Fiat works are to be enlarged and that a great deal of new machine tool equipment is to be installed in the existing plant. These changes at the works are probably contingent upon orders for machinery for the N. G. I. vessels.

Comparison of Six Largest Motorliners on Order

NAME OF SHIP	GROSS REGISTER	POWER	NAME OF OWNERS	LENGTH		BREADTH		DEPTH	
				FT.	IN.	FT.	IN.	FT.	IN.
ITALIA .....	31,000 tons	27,000 s.hp.	Navigazione Generale Italiana	706	0	..	..	..	..
.....	23,500 tons	18,000 s.hp.	Cosulich Societa Triestina	631	3	79	6	45	6
.....	23,500 tons	18,000 s.hp.	Cosulich Societa Triestina	631	3	79	6	45	6
ALCANTARA .....	22,000 tons	15,000 s.hp.	Royal Mail Steam Packet	655	8	78	6	..	..
ASTURIAS .....	22,000 tons	15,000 s.hp.	Royal Mail Steam Packet	655	8	78	6	..	..
CARNARVON CASTLE .....	20,000 tons	15,000 s.hp.	Union Castle Line	630	0	73	0	46	0

Figures relating to ships under construction do not have the same finality as registered dimensions.

## Keel of 24,500 Tons Cosulich Liner Laid

Construction Begun on First of Two Large Passenger Ships for Transatlantic Trade Under Italian Flag

AT the Cantiere Navale Triestino of Monfalcone, Italy, the keel of one of the largest motor passenger ships in the world was laid on May 30th last. The keel of a sister ship is to be laid later. The principal dimensions of these two vessels, which are being built for the Cosulich Societa Triestina di Navigazione, are as follows:

Length o. a. .... 631 ft. 3 in.  
Breadth, molded ..... 79 ft. 6 in.  
Depth to main deck ..... 45 ft. 6 in.  
Gross register (about) ... 24,500 tons

The vessels will have five continuous decks, one part deck, a bridge deck, a promenade deck and a boat deck. The upper part of the hull will be built of high tensile steel. There will be a double bottom extending the whole length of the ship, serving for fresh water, fuel oil, lubricating oil and ballast. The hull will be subdivided by means of ten transverse watertight bulkheads arranged in such a manner as to ensure the buoyancy of the ship with three compartments flooded, and all doors to the watertight compartments will be fitted with hydraulic closing mechanism operated from the bridge. For protection against fire the passenger accommodation will be subdivided by means of fire bulkheads, spaced 130 ft. apart and permitting a section of the

accommodation to be isolated in case of danger.

It is expected that a speed of 20 knots will be obtained, the propelling machinery consisting of two double-acting 4-cycle 8-cylinder engines of the B. & W. type developing an aggregate of about 18,000 s.hp.

This machinery will be built by the Stabilimento Tecnico Tristino, and is the largest Diesel machinery yet ordered. There will be three generating sets to take care of the electrical needs aboard the ship. Two will be 6-cylinder engines direct connected to 900 kw. generators and the third will be a 3-cylinder engine direct connected to a 450 kw. generator.

All the first-class public rooms will be decorated in an elaborate style by famous architects. In the ball room, which will be about 62 ft. long and 49 ft. broad, there will be a stage, and at the other end an entrance hall luxuriously decorated and finished with a monumental staircase of about 50 ft. In the first-class dining room there will be seating accommodation for 250 passengers, and adjoining it there will be a small private dining room, grill room, children's dining room, bar and florist's. Other comforts to be provided are a children's playroom, a swimming pool, gymnasium, Turkish baths and electric baths.

There will be family suites composed of bedroom, sitting room, maid's room and bath room. All the other first-class cabins will be provided with private bath and toilet, and all staterooms will have telephones and be ventilated by a thermo-tank system. Between the various decks in the first-class accommodation there will be elevator service.

In the second class there will be accommodation for 200 passengers and in the third class for about 800 passengers, all of whom will be accommodated in cabins and for whom there will be a lounge and music room, smoking room, reading room and writing room.

A very complete hospital service is to be installed, comprising of doctor's rooms, dispensary, disinfecting room, hospital for ordinary cases and hospital for infectious diseases, all with separate departments for men and women. Barber shops will be provided for ladies and gentlemen. A daily newspaper will be printed on board and the radio service will include reception of broadcasting.

In addition to the passenger accommodation there will be cargo capacity for about 9,000 tons, the holds being served by six hatches worked by 16 electrically operated winches.

# Aorangi's Automatic Record of Courses

Interesting Comparison Between Steering by Hand and  
Using the Metal Mike Is Shown by Graphs.

CAPT. CRAWFORD of the m.s. AORANGI reported having averaged 17.04 knots on his last trip on the Canadian-Australasian run, arriving at Vancouver, May 22nd, while on the part of the voyage between Honolulu and Victoria, B. C., the average was 17.4 knots. This compares very favorably with an average of 16.85 knots for the trip on her previous northward voyage. She has set up a new record for this run, though her schedule does not call for an average of more than about 16 knots to keep well within her time and she has not been driven at her full speed. The best day's average on the last voyage was 17.6 knots, and good weather was experienced during most of the trip except from Australia to New Zealand when the ship met strong headwinds.

While the power of the engines is the main factor in attaining speed, accurate steering is now recognized to make a more important contribution than it had formerly been given credit for. The adoption of the gyro compass has led to the development of automatic steering machines controlled by the gyro compass, and the addition of an automatic course recorder to the ship's equipment tells an interesting story of the difference between hand steering and automatic steering of the ship.

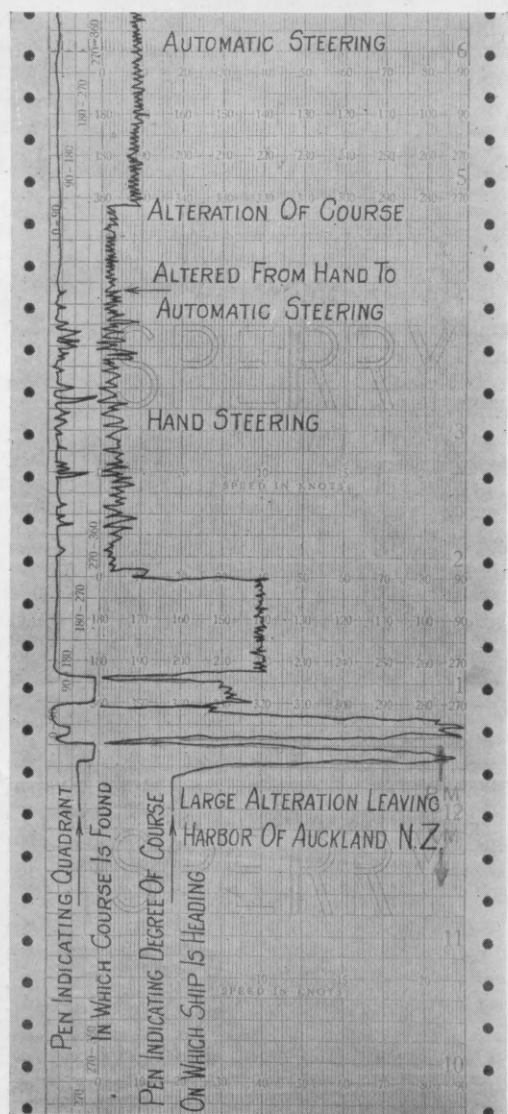
The navigating equipment of the AORANGI includes many of the most modern devices for achieving greater accuracy, while the time honored methods are kept in reserve.

Probably the most useful of the new devices on the AORANGI are the Sperry gyro compass and the Sperry automatic steering machine controlled by it, and familiarly known as Metal Mike. The master gyro is in a well protected room by itself, being run by an electric motor. A storage battery in reserve is cut in automatically in case the electric current from the ship's generators fails for any reason. This gyro is usually started running a day before the ship leaves port in order to get accurately steadied on the true meridian which it automatically finds for itself, though it is set roughly to true north before starting up, to facilitate this. The steering compasses and those for taking observations are electrically controlled from the master gyro, and have the advantage over the ordinary magnetic compass that the north point of the compass card always points true north, and is not affected by deviation and variation or by the changes in these which affect the magnetic compass. However, the magnetic standard compass and steering compass are retained and are a valuable check and reliable stand-by in case of accident.

Metal Mike, the automatic steering machine, is installed in the pilot house on one side of the ordinary handwheel controlling the electro-hydraulic steering gear and has the gyro steering compass mounted on top of it. The ordinary methods of steering are used when entering or leaving port, but when there is no longer need for frequent course alterations the ship is steadied



Capt. Crawford looking into gyro-compass on top of Metal Mike



Graph of Aorangi's course leaving port

by the quartermaster on the required course, and then Metal Mike is thrown into gear and takes up the duty of keeping her there.

Metal Mike is capable of a number of adjustments. The amount of helm for every degree the vessel swings off the set course can be regulated to suit a smooth or rough sea. The machine can also be adjusted so that it does not begin to give helm to correct a swing till the ship's head has deviated a set number of degrees from the course. This is to allow for the natural yawing of the ship when running in a heavy sea. A natural swing of about  $2\frac{1}{2}$  degrees on each side of her course is allowed for in heavy weather, and under these conditions Metal Mike is set to start giving helm at about 2 degrees. With a calm sea, the instrument can be adjusted so finely that it commences giving helm to counteract any deviation exceeding a sixth of a degree from the course.

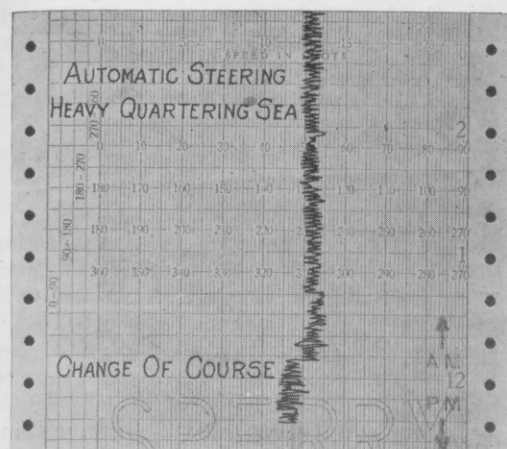
While steering in a rough sea shows the ship's head swinging about three degrees on each side of her course, the course recorder in calm weather shows a variation of little more than a degree on each side of the course; and the course of the ship can be steered to a half degree. With hand steering no attempt is made to steer to anything closer than the degree, and many compasses are only graduated to quarter points (about 3 degrees), this being deemed about as close as it is practical to keep to a course under ordinary conditions at sea, with hand steering.

After setting a course with Metal Mike, alterations of course from  $\frac{1}{2}$  degree up to 10 degrees can be made by turning a small wheel which clicks for every half degree. Large alterations of course can also be made with this machine, and the ship having been steadied within ten degrees of the new course final adjustment is made by the more accurate method.

The Sperry course recorder, by means of which the record of the courses for the whole voyage are kept on a roll, illustrates graphically the accuracy of the automatic steering device and the difference between it and ordinary steering with the quartermaster at the wheel. The prepared strip of paper on which the recording pen leaves its mark is ruled to show the time in hours, divided into ten minute intervals, and the course in degrees. One pen indicates the course in degrees and the other the quadrant of the compass in which the course is found.

The sample copies of the graph show records of steering under different conditions.

One is a copy of the record of leaving the harbor of Auckland, N. Z., from the time the ship got under way, steering with a quartermaster at the wheel, till she was well out to sea and had steadied on her course with the automatic steering machine put in control. The final jog in the course indicates an alteration of about 7 degrees. The large swings of the record-



Graph of ship's course in heavy sea

ing pen right across the graph at the start indicate large alterations of course leaving harbor. The irregularities in the line between two and four o'clock show the way the ship's head was swinging from one side to the other of her course with hand steering—the ship's log entry for 4 p. m. gives a strong North wind (ahead) with moderate to rough sea. The final part of this record shows the much improved steering with Metal Mike.

Reading off the graph, the ship was first heading 198 degrees (S. 18° W.), then she swung till heading 272 degrees (N. 88° W.), altered back to 1 degree (N. 1° E.) until there was another alteration of course to 90 degrees (E.) and so on. These courses no doubt included backing out from a wharf and heading out for the channel, besides turns in the channel. Finally she is on a course about N. 2 degrees E. for several hours, and then alters to about N. 9 degrees E.

Another is a copy of the record of automatic steering with a heavy quartering sea, the log entry showing course N.E. by E., wind W.S.W., force 5 (about 21 m.p.h.), rough sea. A change of course is also indicated on this graph.

A third copy gives the record of automatic steering in calm weather at sea, the log entry being: light wind, smooth sea, slight swell. In No. 3 it will be observed that the ship's head swings little more than a degree on each side of the course with Metal Mike at the helm. In the rough quartering sea in No. 2 there is a swing of about 2½ degrees on each side of the course, this being largely the natural yaw of the ship in a seaway, which has not been unduly checked by the automatic steering. In No. 1 with a head sea the automatic steering leaves a record of the ship's head swinging about 1½ degrees on each side of the course, while the hand steering under the same conditions gives an average swing of about 4 degrees each side of the course and some swings of as much as 6 degrees or more each side.

R. Denniston, the second officer, took a special course in the Sperry gyroscope and automatic steering devices while the ship was building.

Among other interesting instruments in the pilot house and chart room of the AORANGI is a radio direction finder, by which the direction of any other ship or shore station within reach of the small aerial can be ascertained.

There are two different logs for recording the ship's speed, one a Trident electric

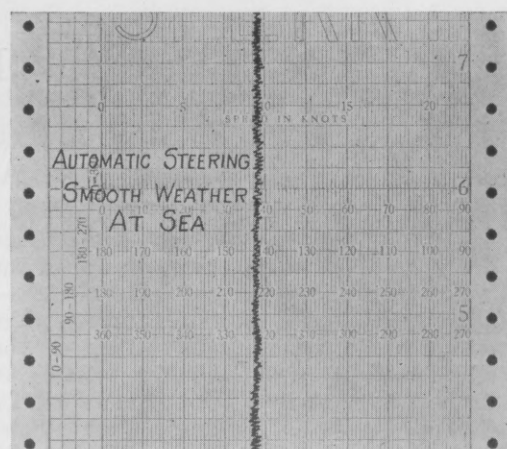
log of the taffrail type, towing a rotator at the end of a line and having an indicator dial in the chart room, and the other a Sal log (Svenska A/B Log) which records the speed through mechanism actuated by pressure on a pipe projecting through the bottom of the hull, the pressure increasing in proportion to the speed. This log also has recording dials in the pilot house.

An automatic whistle control is fitted for sounding blasts at the required intervals when under way in fog.

There is a master clock in the chart room controlling the other clocks in the ship.

A range finder on the bridge, of a type similar to that used by naval vessels, is used for finding the distance of light-houses, etc. Another convenience is a clear view screen, a revolving disc of glass, which throws off by centrifugal force the rain or spray that beats upon it.

An interesting balancing machine is the Ralston stability and trim indicator, on which a plan of the ship is marked. Little weights, representing the weight capacity of the different holds, tanks, and double bottoms when full, and also weights for passengers, stores, etc., are placed in position to correspond with the actual weights in the ship. The whole model is then lifted on a balance, where an indicator



Graph of ship's course in smooth sea

shows the amount she will trim by the head or stern. This machine also indicates the stability with any given distribution of weights.

A rapid course and bearing layer mounted on an extension arm, and having a dial and pointers indicating both true and magnetic courses, replaces the ordinary parallel rulers for work on the chart table. Various other aids to accuracy and other labor saving devices have been included in her equipment.

### Canadian Subsidy for Aorangi

For operating the AORANGI, a 17-knot motorliner of 22,000 tons displacement, and a steamer of 13,000 tons displacement between the west coast of Canada and New Zealand, the Union Steamship Company of New Zealand has been granted a subsidy of \$100,000 by the Canadian House of Commons.

### Swedish Government Loans

From 1918 to 1924 inclusive the Swedish government loaned a total of about \$6,250,000 to Swedish shipowners for the construction of new vessels. More than one-half of this amount was used for motorship construction. The loans usually run for a period of eight years, although in special cases ten years have been allowed. The amount of the loan may equal 50 per cent of the cost of the ship, and interest is paid at the rate of 4 per cent. No repayment is required during the first two years, but thereafter annual payments of one-sixth of the amount must be made. If these amortization payments are not made on the dates due, the interest rate is increased to 6 per cent per annum for the amounts in default. As security, the government takes a first mortgage on the ship, accompanied by a guarantee from the stockholders and in most cases also a bank guarantee.

### Italian Motorship Subsidy

The Italian government has decided to entrust the operation of the subsidized steamship lines of Southern Italy to the Florio firm of Palermo, Sicily, which will form a new company with a capital of nearly \$2,000,000. The new concern undertakes to replace the tonnage at present employed on those services by four 16 knot motorships of 4500 tons, and four further motor vessels

varying between 2500 and 3000 tons. The Italian government hereby definitely ranges itself with motorship progress. The ships will probably be built at the Cantieri Navali Riuniti at Palermo and equipped with M. A.N. Diesel engines and contra-propellers.

It is stated that the Adria S. S. Co. of Fiume has arranged with the Italian government for a subsidized shipping service from the Adriatic that will lead to the order of two motorships of between 2500 tons and 300 tons.

It is thought probable that the plans of the Canadian government for a subsidized motorship service between Canada and the United Kingdom may be completely altered as a result of the death of Sir William Peterson, the British shipowner with whom the Canadian government was negotiating. Sir Wm. Peterson died in Montreal last month, soon after he had arrived there to appear before the Ocean Rates Committee to which the Canadian Parliament had referred the subject of the proposed contract.

The Spanish government has agreed to pay the Compania Trasatlantica of Barcelona, Spain, an annual subsidy of \$5,460,000 for the next 25 years, in return for which the company agrees to maintain a fleet of modern ships and to carry mail and perform other services necessary to the government.

The Tasmanian Government which began merchant marine operations in 1920 has sold its two ships to the Union Steamship Co. of New Zealand at a loss of about \$1,000,000. A profit had been shown on operations during the year 1920, but considerable losses were made afterwards, and in 1924 a Labor government decided to sell the ships.

# Airless Injection Adopted by Oldest Diesel Builders

After 32 Years of Experience with the Diesel Engine, the Famous  
Augsburg Firm Dispenses with Compressor

A PROBLEM, the solution of which has been sought since the beginning of the development of the Diesel engine in 1893—possibly because it appeared to offer the most direct opportunity for attack—is the injection of fuel into the engine cylinder in the form of a spray without the assistance of compressed air. The Diesel engine, however, was developed with the aid of air injection. Within comparatively recent times technicians have renewed their efforts, often frustrated by failures and interruptions, to conquer the problem. As the chief motive for this effort there was the wish to secure a substantial simplification in the construction and operation of the engine, such as would result from the discarding of

directly into the combustion space under suitable pressure, a proper distribution of the fuel being insured by the general arrangement of the combustion space and the location of the jets within it. A sort of compromise type, which is sometimes treated as a separate group, is the one in which turbulence of the air is produced by the shape of the piston or by two fuel jets impinging upon one another.

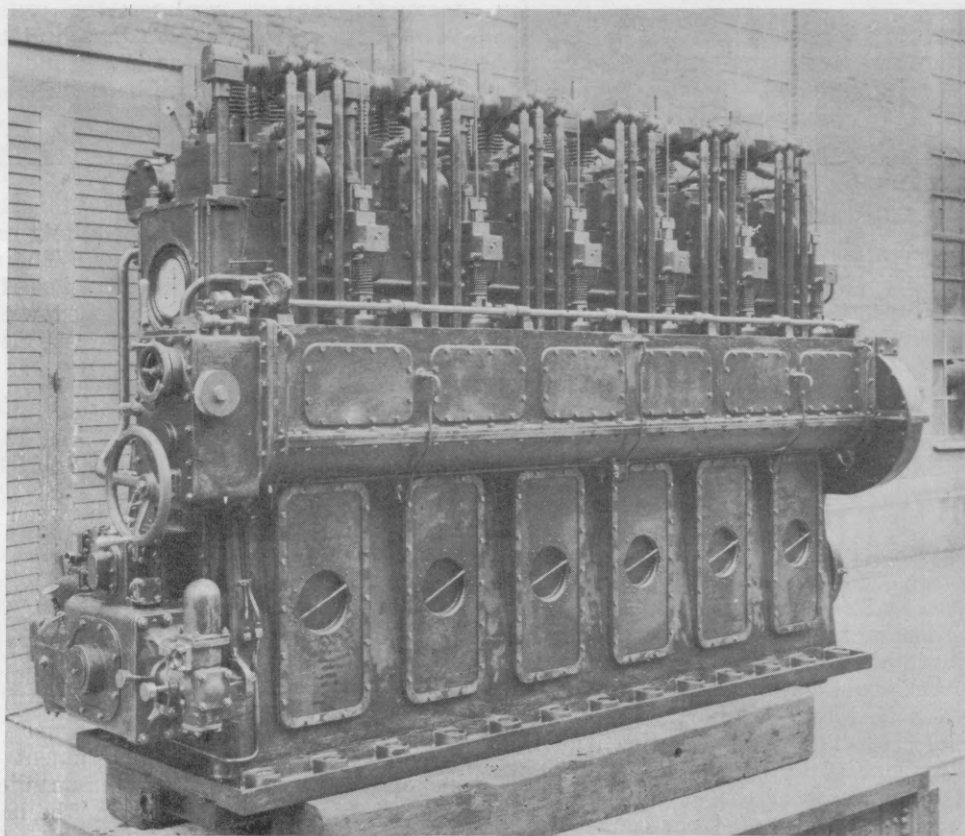
The airless injection 4-cycle Diesel engine of the M. A. N. company belongs to the second group, characterized by "jet atomization," as Professor Nägel calls it. Fuel is delivered under pressure by the fuel pump through heavy tubing into an open nozzle, and from there enters the cylinder through

pressure to full pressure in the injection line, the beginning of the combustion itself, as well as smooth combustion coupled with good regulation, is assured at very low engine speed. A further advantage of the open nozzle is that air which may separate out from the fuel cannot collect and produce disturbance, but is carried along and eliminated under all circumstances. As the result, though, the engine will temporarily lose power if air is present, it will not come to a standstill.

The fuel pump plunger is actuated by a cam on the camshaft, and its shape is such as to insure a suitable variation in the motion of the plunger corresponding to the gradual yet sufficiently rapid pressure rise in the injection line referred to above. Regulation is accomplished by the opening of an overflow valve after a part of the plunger travel has been completed, an arrangement which results in making effective only a part of the plunger stroke, while during the remainder the fuel flows back into the suction chamber of the pump. Consequently the beginning of injection remains unaltered, while the end of fuel delivery varies according to the actual or the required load. The tappet to open the overflow valve rests on a lever eccentrically fulcrumed on the governor shaft and moved up and down at the opposite end by the pump plunger guide.

According to the position of the eccentric bearing of the level end—raised or lowered by the governor as required—the overflow valve opens sooner or later, with the result that the delivered quantity of fuel is correspondingly decreased or increased. Regulation is influenced on the one hand by manual control (corresponding to the throttle of a steam engine) and on the other hand by a safety governor which prevents the higher speed from being exceeded. So much for the operating characteristics of injection and the engine parts connected with it.

The structure of the machine is characterized by the so-called box frame. Since the bedplate is built high enough to extend far above the shaft center line, it forms an oil-tight closed-off casing on which the cylinder blocks are mounted. The high walls of the bedplate have a great moment of resistance against changes in form, a fact which makes this design particularly desirable for marine work and which has already demonstrated its worth in many hundreds of U-boat engines. Transverse girders within the casing carry the crankshaft bearings, the halves of which consist of steel lined with white metal. Steel tie-rods are attached directly next to the main bearings and extend upward through the box frame and the cylinder blocks to the upper surface of the latter. As the result of the initial strain to which the tie-rods are subjected, they eliminate from the frame the tension stresses resulting from combustion and which must be taken up between the cylinder-head and crankshaft. This is the shortest path for the flow of these forces



*M. A. N. airless injection type of engine*

the injection air compressor. At the same time these simplifications would permit of reducing the cost of manufacture.

Airless injection today has been developed in a number of different forms, of which two main groups may be distinguished. All of such engines now commercially offered may be said to belong more or less to one or the other of these groups. One of these comprises engines with a pre-ignition chamber which, as constructed in a variety of different forms, serves the purpose of producing turbulence in the entire charge of combustion air through the burning of a fraction of the injected fuel. The object of turbulence is of course to make all the combustion air available to the individual particles of fuel.

The second of the groups is ear-marked by the introduction of the fuel spray di-

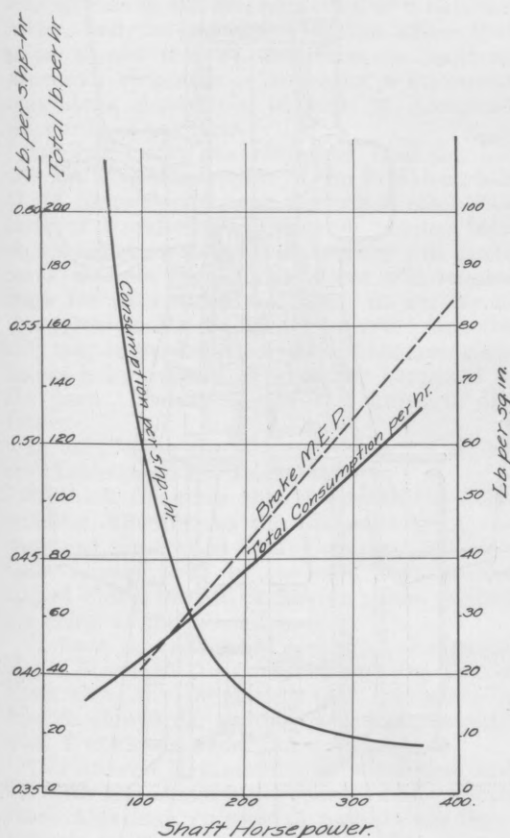
a number of fine drilled holes towards the end of the compression stroke, shortly before the upper dead center is reached by the piston. No sort of attached apparatus, either automatic or cam-actuated needle—is used. The rise in pressure in the discharge line from the pump, the entry of the fuel into the combustion space and the combustion itself take place without any sharp knock. The pressure rise is no greater than that caused by the passage of the fuel through the drilled holes in the nozzle.

Easy working is apparent not only at normal revolutions, but particularly also at low speeds such as those occurring while the motor is being started or when the engine is to run at greatly reduced power, as is essential for marine service. As the transition from low to high speed is accompanied by a corresponding change from zero

between the cylinder-heads and the crankshaft bearings, and the metal for taking them up is available there. Since the box frame is protected against tension loads of this kind it has been possible to put large apertures into it, a provision which renders the moving parts accessible and facilitates the work of taking down and assembling.

Cylinder liners of special cast iron are interchangeably fitted to the cylinder blocks and are provided at their lower ends with stuffing boxes for the cooling water. They are free to expand as the result of warming up. Cooling is accomplished in the usual manner by means of two pumps, of which one alone is sufficient; they are direct driven by the engine at its forward end.

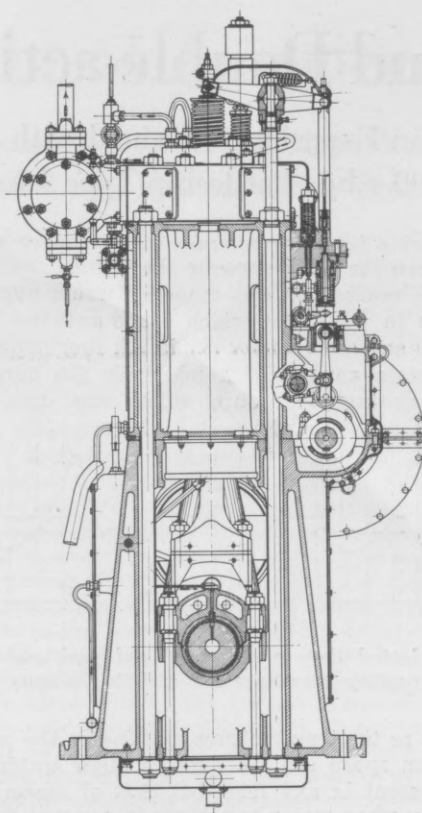
The piston is deeply dished, and in addition to the usual piston rings also carries an oil scraper. A closed bronze bushing is used for the connecting-rod bearing in the pistons, whereas the lower connecting-rod bearings are made in two halves connected by means of two bolts to the palm of the



Fuel and power curves of 300 hp. engine

connecting-rod. There are shims between the crankpin box and the palm of the rod, which may be suitably chosen for adjusting the cylinder compression.

Half way up on the engine frame a camshaft driven by spur gearing is located; on it are mounted the cams for suction, exhaust and starting valves which are actuated by means of hollow and therefore lightly-built push-rods. Cams for the fuel pumps are also mounted on the camshaft and have serrations for adjusting their settings. A trough connected to the box frame contains the camshaft bearings and is closed off oil-tight. Forged steel fuel pump bodies are bolted to the cylinder blocks, and they are constructed with single and independent units for each cylinder. With a view to obtaining the greatest possible accessibility and simplest operation, the mounting of several pumps together has been avoided in spite of the apparent simplification which

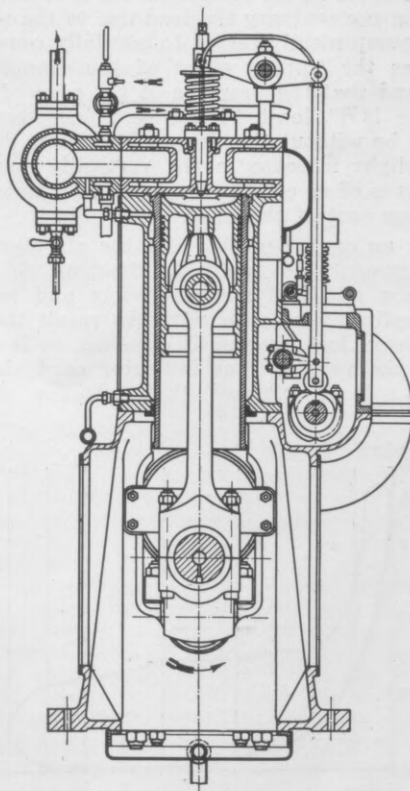


Section through new M. A. N. engine

the latter procedure appears to offer at the first glance.

Forced lubrication is used on the engine. A gear pump directly driven by the engine takes the oil from the sump tank located directly under the engine and forces it through a filter into the pressure supply line and thence to the local distributing points.

Drilled holes in the hollow crank journals permit the entry of oil and the lubrication of the bearings, and oil is also fed through passages in the crankshaft to the crankpins and thence to the wrist pin bearings through the connecting-rods. The camshaft, gears and other essential parts are connected with the general force-feed lubrication system so that only a few parts not re-



Section through new M. A. N. engine

quiring much oil must be lubricated occasionally by hand.

Of special importance for marine work is the reliability in operation, simplicity and dependability of reversing gear. In the case of the M. A. N. engine reversal is accomplished according to the well-established system of side displacement of a camshaft fitted with separate sets of cams for ahead and astern running.

Reversal can be accomplished between full ahead and full astern in from seven to nine seconds. A safety governor makes it impossible for the engine ever to run away in such cases, for instance, as emergence of the propeller from the water. Fuel consumption is unusually low, this being true not merely at full load but also at partial and over loads, as may be seen from the curves herewith. This is of considerable advantage, because economy is high while the engine is running at low speeds under conditions such as are frequently encountered. The engines have given an excellent account of themselves as constructed for cargo boats on the Danube and the Rhine Rivers; a large number of additional engines are nearing completion, among them being some units for deep sea ships.

The first picture of these engines and preliminary details of them were given in MOTORSHIP last year. A more detailed description is now of interest because the American licensees are building this type. The New London Ship & Engine Company has already thoroughly tested a 300 hp. engine of this design and has installed it in a towboat. A series of these engines is now being manufactured by the Nelseco Plant at Groton, Conn.

The Diesel electric ship *FORDONIAN* is again this year being operated in the Montreal grain trade by W. M. Connelly of Buffalo, on behalf of the owners.

It is stated that all the motorships of the East Asiatic Company are now being equipped with centrifuges for cleaning the lubricating oil.

Vickers-Petters in England are stated to be testing a 700 hp. engine which follows their standard design. Hitherto the biggest engine of this class has been of the Beardmore type installed in the *MARGRETIAN*, a vessel of 4500 tons d.w. Plenty's, another British firm, are reported to have a 4-cylinder 600 hp. engine nearly ready for test, in which the Still combination of steam engine and oil engine is incorporated. These three examples of 2-cycle engines with crankcase compression show that there is a growing opinion on the other side that a cheaper type of oil engine than the Diesel engine can be used in vessels requiring not more than 1400 hp. or 1500 hp.

It looks as if the sale of Diesel engines in the Kwangtung province of China will be boosted by the new sales tax on kerosene introduced by the Canton government. Many of the engines hitherto sold for service on the Chinese rivers have used kerosene as fuel. With the new tax of 4 cents a gallon on kerosene there will be a much greater incentive for owners of boats to purchase engines that can burn fuel oil. It is stated that the foreign oil companies are protesting against the tax.

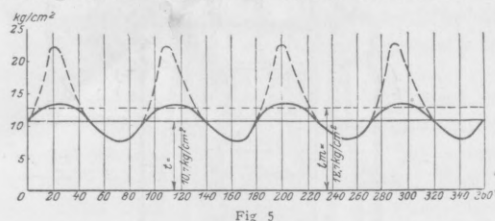
# New Single-acting and Double-acting Krupp Engines

Design Based on Experiences Gained with the Builder's  
12,000 s.hp. Battleship-Type Engine

SO much has been heard of the Krupp-engineered Standard Oil tanker ZOPOT, that interest is sure to be felt in the builder's two latest designs of mercantile marine engine, particulars of which have recently come to hand. A description appeared in the January, 1925, MOTORSHIP of the historic Krupp 12,000 s.hp. double-acting engine which was to have been used for driving battleships. Advantage has been taken of the experience gained with this engine in designing the new merchant-marine Diesel engines, which, however, differ from it on many important points. Of these

survive a tendency to crack on the upper side between the holes opposite the valves.

The reason for this tendency would appear to lie in the space which exists between the shield and the cylinder head. All fuel contains a certain amount of sulphur; in the normal arrangement without a shield this does not



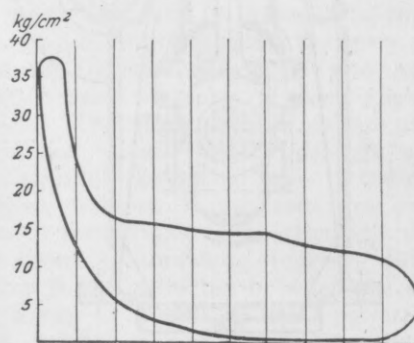
The dotted lines show combined fuel and air starting increases the starting torque

harm as the temperatures existing in the combustion space are too high to allow water to be present in any form but that of steam; it is only when water is present in aqueous form that it combines with sulphur to form sulphurous acid. Where a shield is used, however, it seems probable that the slight gap between the shield and the head has sufficient cooling effect to condense the moisture and allow the formation of sulphurous acid upon the shield.

Ample water spaces are provided around the cylinder, which has scavenge and exhaust ports on opposite sides. The exhaust ports extend round one-half of the circumference, and are on the same level as the scavenge ports. The piston crown is of forged steel with a concave top.

An unusual arrangement of scavenge pump drive is found on this engine, where an arm on the crosshead serves both to carry the piston cooling water pipes and the piston rod of the double-acting scavenge pump. It might appear at first sight that this would have a tilting effect on the crosshead, but it is claimed that on the contrary the load due to the scavenge pump merely serves to partially counterbalance the tipping effect of the connecting rod, and that the pressure at the edge of the slipper is at least 14 per cent less than it would be without this form of scavenge drive. The slight increase in the vertically moving masses is of no consequence as it only amounts to 4 per cent of the total.

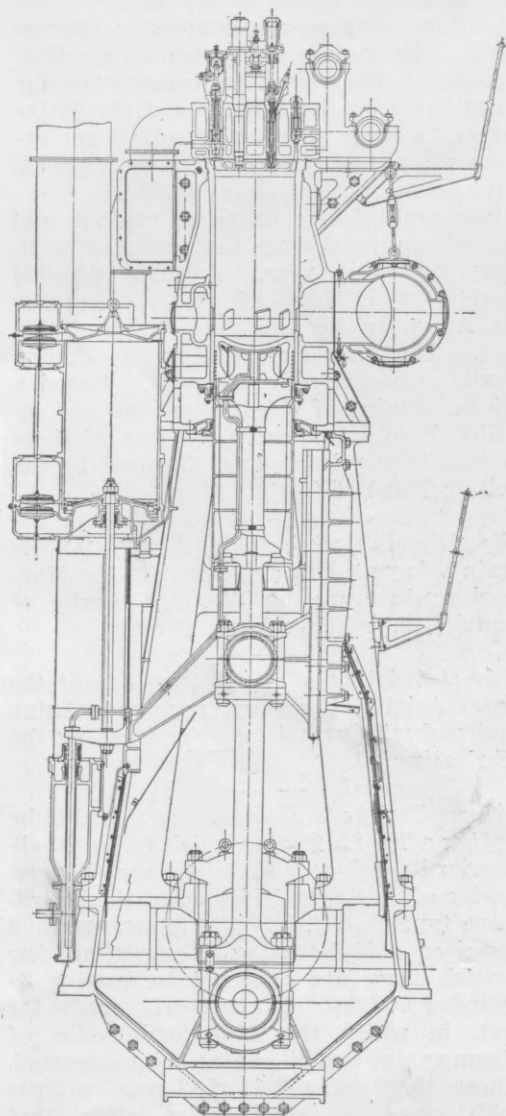
For an engine of this size the air starting arrangements are unusual. Starting air and fuel are admitted simultaneously and to all four cylinders at once, with the result that a very large mean torque is obtained, as is seen from the very curious indicator card shown below. It is claimed that whereas using



Curve showing increased starting effort obtained by injecting fuel while air is admitted

compressed air alone the starting mean effort at right angles to the crank arm, referred to piston area, is 151 pounds per sq. in., with simultaneous fuel injection it is 180 lb. per sq. in. When the normal method of air starting is used, that is to say, when half the cylinders are put on fuel while the remainder are still operating on air, the figure is only 54.5 lb. per sq. in. under the worst condition when the cylinders on fuel have not yet started to fire.

The double-acting engine follows the design of the single-acting one fairly closely. The

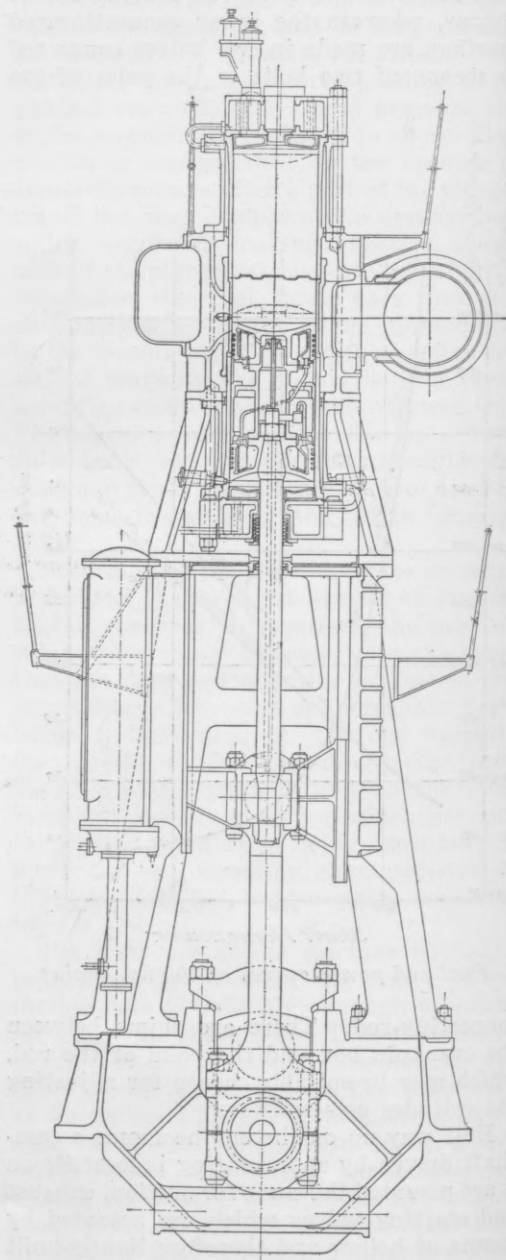


Single-acting engine shows scavenger driven by piston cooling arm on crosshead

new engines one is single and the other double-acting, while both are of the two-cycle type.

Present day practice is conformed to in most respects on the single-acting engine, which develops 1600 s.hp. in four cylinders. The cylinder head is of normal design except that the fuel valve is offset from the center line of the cylinder.

Below the cylinder head is a water-cooled shield, which is only attached to the cylinder by the water connections. This arrangement ensures that the shield is free of all mechanical stresses and only takes the heat stresses. In spite of the fine record of the ZOPOT in which this arrangement is in force, some doubt may be felt as to whether these shields will



Krupp double-acting engine of modern design

cylinder liner is in three parts with a space for expansion between each. The abutting edges of these parts are staggered so as to prevent the piston rings from catching in the gap. At the lower combustion space the valves are nearly horizontal and communicate with the cylinder through the liner. This gives the water-cooled shield a better chance of survival, since there is only one central hole through it, that for the piston rod. The piston rod gland is of the usual form and the rings are well removed from the combustion space.

# Encouragement of American Shipbuilding

## Promoting Ship Construction in American Yards by a System of National Loans to American Shipowners

**A**N earnest plea for active steps to be taken to influence Congress favorably towards legislation for the protection of American shipbuilding was made by F. P. Palen, Vice-President of the Newport News Shipbuilding & Dry Dock Co. at the annual meeting of the Atlantic Coast Shipbuilders' Association. A copy of his speech and of the tentative appeal he has drafted for presentation to Congress is reprinted here as an inspiration to all who have the welfare of American shipping at heart.

It may be premised that a criticism in one of the New York daily papers stated that protection for American shipyards is not needed because the world is over-tonnaged and this is not the time to seek protection. Mr. Palen's answer is that any period of time is of little consequence in the determination of a national policy, and the statement to the effect that ships should not, at this time, be built in American shipyards is in reality a statement that ships should not be built in American shipyards at any time.

Another critic has remarked that the bill will not have the support of the President, nor of the State Department, nor will it meet with favor of a majority in Congress, because they do not believe a national emergency will again occur wherein the United States will require ships for its national defense. In answer to this criticism Mr. Palen has reported that the only way to predict the events of the uncertain future is by a study of what has happened in the past. History is our best guide to the future.

In his plea to the Atlantic Coast Shipbuilders' Association Mr. Palen stated—

"I think Congress should protect the shipbuilding industry, so the Standard Oil Company and the United Fruit Company will have their vessels built in the shipyards of the United States instead of foreign yards, as they are doing at the present time.

"I have no criticism to make of the action of the Standard Oil Company and the United Fruit Company in placing their contracts in foreign shipyards, as they are doing exactly what I would do under our present laws.

"My quarrel is, therefore, with our laws and not with the steamship owners. Laws which cause American citizens to buy vessels from Krupp's when at the same time they do not buy machinery or steel from Krupp's are not just and fair to the shipbuilding industry of the United States.

"If the vessels ordered by Americans from foreign yards during the past two years had been built in the shipyards of this country, this work would have gone a long way towards keeping the shipyards going.

"On the other hand, if Congress does not provide protection for the industry, which will be sufficient to cause the vessels required by American owners to be built in the United States, I can see no hope for the industry. I speak as a disinterested person, as I have no financial interest in any shipyard.

"Congress may think that the machinery and steel industries are of more national importance than shipbuilding and therefore should be protected, but in time of war shipbuilding always has been more important and always will be, so it seems to me that as a matter of national defense as well as a matter of equity, equal protection should be given to these industries.

"If the President and Congress believe that shipbuilding should be protected so American citizens can have vessels built in the shipyards

of the United States at a cost as nearly as possible on a parity with the cost of building them in other countries, then the problem becomes very simple. There are many ways of protecting the shipbuilding industry to accomplish this result.

"American owners should be encouraged to build in the United States shipyards rather than forced to do so, and with this thought in mind I think the simplest and most direct method of protection will be the best.

"I therefore recommend an investment by the Government in vessels for foreign trade equal to the excess cost of building vessels in the United States, and in return for this investment the United States retain certain rights in the vessels from which a direct benefit will result, as well as the indirect benefit resulting from maintaining the industry.

"In time of war, the United States has always paid excessive prices for ships, on account of its shipping policy. In fact, the United States spent, lost and wasted enough money on account of its shipping policy during the last war to protect its shipbuilding for the next one hundred years.

"I appreciate that the United States has the right to commandeer vessels in time of war, but this right is of no value if there are no vessels under the American flag that are suitable for its purposes, as was the case during the Spanish War and the World War. We are approaching the time when the obsolete vessels must be replaced. The Standard Oil vessels and the United Fruit Company vessels, above referred to, will not fly the American flag, and therefore cannot be commandeered by the United States, but can be commandeered by the nation whose flag they fly.

"If the United States will invest wisely reasonable sums year by year in vessels operated by American citizens in the foreign trade, it will benefit and build up its shipyards and shipping and will make available vessels when needed, at reasonable prices.

"I have set forth these thoughts in the form of a bill for presentation to Congress and I suggest that the shipbuilding industry request the President and Congress to provide protection sufficient to accomplish the results I have above outlined."

### Tentative Bill for Protection of American Shipbuilding

*Drafted by F. P. Palen.*

#### AN ACT FOR PROTECTING THE SHIPBUILDING INDUSTRY OF THE UNITED STATES OF AMERICA

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

Sec. 1. To provide vessels under the American flag that can be purchased or chartered at reasonable prices by the United States in time of war or national emergency, to provide for the purchase and charter of such vessels by the United States at reasonable prices, to provide for the replacement of vessels in the foreign trade as they become obsolete, to encourage citizens of the United States to build vessels to meet the demands for the proper growth of our foreign trade, and to maintain a force of workmen skilled in the art of shipbuilding in the shipyards of the United States, it is declared the policy of the United States to encourage and aid its shipbuilding industry sufficiently to cause ships to be built in the shipyards of the United States for the foreign trade. To accomplish this end, the United States will acquire an interest in the vessels built under this Act and

will pay a portion of the cost of vessels so built.

Sec. 2. That the Government of the United States shall have the right in case of war or national emergency to purchase or charter any of the vessels built under this Act upon the conditions and terms hereinafter set forth; that in the event a vessel built under the provisions of this Act is owned or operated in violation of its terms or the flag changed during the period the United States has an interest therein, the vessel shall be subject to seizure and sale by the United States and the rights of the United States as to its interests therein shall take precedence over all mortgages, claims, liens, etc., against the vessel, and notice to this effect shall be recorded in the Custom House at the vessel's hailing port and on the vessel's papers carried on board.

Sec. 3. That vessels built under this Act shall be owned by citizens of the United States as provided for in the Merchant Marine Act of 1920; the vessels shall be of the most modern design, and shall be approved by the United States Shipping Board; the vessels so built shall not engage in the coastwise trade of the United States; the price of vessels built under this Act, together with the price of changes made during the construction of the vessels, shall be submitted by the owners to the United States Shipping Board for approval.

Sec. 4. That there shall be paid from any money in the Treasury not otherwise appropriated, upon the warrant of the Chairman of the United States Shipping Board and with the approval of a majority of the members of the Board, to the builders of vessels in the United States who conform to this Act, a sum not less than 20 per cent nor more than 30 per cent of the cost of each and every vessel so built; the Comptroller of the Treasury shall be and he is hereby authorized and directed to make such payments when duly certified by the Chairman of the United States Shipping Board; and the sum of Twenty Million Dollars (\$20,000,000.00) shall be and it is hereby appropriated for payments to be made on vessels constructed under this Act; the interest of the United States in a vessel so built shall be depreciated at the rate of 5 per cent of the amount paid by the United States per annum, and shall cease at the end of twenty years.

Sec. 5. In the event of a sale and change of the flag of a vessel built under this Act, before the interest of the United States ceases, the United States shall be repaid for the interest it holds at the time of sale.

Sec. 6. That in case of war or national emergency, the United States shall have the option of purchasing or chartering vessels built under this Act for a period of twenty years after the date of documentation, on the following terms:—

If the vessel is purchased, the sum to be paid the owner by the United States shall be the original cost of the vessel to the owner (exclusive of the amount paid by the United States to the shipbuilder) less 5 per cent per annum for depreciation.

If the vessel is chartered, the sum to be paid the owner by the United States shall be at the rate of 11 per cent of the original cost of the vessel to the owner (exclusive of the amount paid by the United States to the shipbuilder), provided that all the costs of operation, maintenance, repairs, insurance, etc., are paid by the United States during the charter period and the vessel is returned to its owner in as good condition as when chartered, ordinary wear and tear excepted.

Mr. Palen adds that the United States can give protection equivalent to Sec. 4 of the bill by making loans from the Construction Loan Fund equal to 50 per cent of the cost of the vessels built in the shipyards of the United States for the foreign trade, without interest and payable in 20 equal installments.

## Analyzing Compressor Troubles and Avoiding Them

IN the June issue of *The Compass*, which is the house magazine of the Vacuum Oil Company, there appeared a thoughtful article on compressor lubrication written by the technical department of that organization. The analysis of the troubles that can occur with high pressure air compressors and the conclusions drawn therefrom are of such general interest that we quote them below—

"(a) Excessive wear of the cylinder is due to the failure to maintain an oil film on the parts affected. This may take place even where a liberal amount of high-grade straight mineral oil is used and can then only be due to the presence of excessive moisture. A correctly selected straight mineral oil will furnish good lubrication when excessive moisture is not present.

"To maintain an oil film even under excessive moisture conditions a high-grade, correctly compounded lubricating oil should be used which will furnish excellent lubrication and thus prevent excessive wear.

"(b) Excessive carbon deposits are generally the result of the use of too much lubricating oil.

"Under ideal operating conditions a very small quantity of oil will maintain an effective oil film with the result that troubles from carbon deposits are negligible whether a straight mineral or correctly compounded oil is used. Under excessive moisture conditions a small quantity of correctly compounded oil will still furnish good lubrication, resulting in less trouble from carbon deposits. The carbon deposit resulting from a correctly compounded

oil is softer than that from a straight mineral oil and easier to remove.

"(c) Explosions in air compressors can only take place under certain conditions. This involves the presence of an explosive mixture, usually a result of an excessive oil feed, impurities in the intake air or both.

"Whether a straight mineral oil or a correctly compounded oil is used to excess, this makes no difference one way or the other when used in equal quantities, as regards the danger of the formation of explosive mixtures. However, with a correctly compounded oil a smaller quantity will give efficient lubrication and consequently the danger of the formation of an explosive mixture is less.

"(d) Corrosion of cooling coils may be due to the formation of free fatty acids, but probably more as a result of the action of the air and water on the cooling coils. With the use of a high-grade, straight mineral oil or a high-grade correctly compounded oil the formation of injurious or corrosive acids does not take place.

"The above tends to indicate that with the use of a correctly compounded oil, due to a smaller quantity being necessary for efficient lubrication, the formation of carbon deposits will be less, and be of a softer nature, easy to remove. For the same reason, the possibility of the formation of explosive mixtures will be less. The more important advantage of the use of a correctly compounded oil, however, is the efficient lubrication, on account of the existence of an oil film even under excessive moisture conditions."

## Messroom, Maxims and Fables

LATE combustion, like late hours, knocks hell out of efficiency.

When you go off watch be sure to have things in the same condition you would like to find them when you come on.

No use to tell the first assistant how hard you have been working if you have nothing to show for it.

If the cooling water stops the engine will get hot. Then if you turn it on too soon something may break.

You can stop the exhaust from smoking by slowing the engine down, but that makes a bad looking log abstract. Better keep the fuel valves clean.

It is the oiler's job to check up on the lubricators and your job to check up on him.

When the first assistant tells you to keep three wipers at work, do it. One man watching and three at work accomplishes more than one working and three watching him. Don't try to pump out the ship with basket strainers clogged up.

If you have tried everything else and cannot stop the air leaks at the fuel valves, try repacking them.

When a drip of fuel from a leaking pipe hits you on the neck, don't wipe your neck. Stop the leak.

When a bearing runs hot, that is a pretty good sign it needed just a little more fat.

If the bridge telegraph runs hot and you have a cramp in the right arm from working it you can get hot too, but don't forget that it is your job to make the engine respond.

However, if the mate wants a handrail repaired do your own work first.

A wrench lying on the gratings over someone's head may fall on you.

By passing the buck you fool yourself.

And the best way to get the valves ground is to start in.

Keeping books may not be an engineer's work, but a well kept log protects you too.

Before blowing out half a dozen fuses see what made the first one go.

If you come right from the bilges into the messroom don't start anything if someone makes a crack about dirty engineers.

Oilers may be the engineers of tomorrow, but if they get drunk give them a dirty job to pay for a dirty trick. Does 'em good.

The chief may be a good fellow, but after all he has to keep things moving.

Which reminds us that there is a chief engineer's ticket with every chief engineer, but not a chief engineer with every chief engineer's ticket.

### How It Works

A paragraph from a report rendered on a valve in use on a motorship reads:—"I could not work on the valve till afternoon. They were trying out auxiliaries in preparation of sailing. This is a motor-driven ship, internal-combustion developed through an air-starting engine, then switched to oil forced in by air from injection tanks which are supplied by main engine air-compressor attached to crank shaft. Oil is then fired by compression. Injection tanks hold 1,000 pounds of air, here the hydraulic is used to step down pressure in storage tanks which are used to run small auxiliary dynamos and an independent air compressor is run by oil. These storage tanks are supplied by independent compressor when main engine is not running. The storage tanks are used for reversing main engine as they have a greater volume than injection tanks."—A. B. N.

## Piston Ring Friction

How considerable can be the differences in the friction of piston rings is exemplified in a report recently issued by the Bureau of Standards in Washington. Measurements of piston friction have been in progress at the Bureau for some time for the benefit of the National Advisory Committee for Aeronautics. Under definite test conditions with a certain design of piston the friction of a full set of rings was found to consume 5 hp., while with another design of piston the friction of these same rings used up only 2 hp. The rating of the engine is not given, but the Bureau states that this variation was probably caused by a difference in lubricating conditions, and experiments are being continued in order to discover the factors which influence piston friction.

## Modern Winch Characteristics

In the specifications issued by the United States S. B. Fleet Corporation for the winches to be installed on the 14 vessels now being converted from steam to Diesel power, the latest practices in electric winch design are shown. These winches are intended for handling general cargo by the burtoning method and will be capable of hoisting 4000 lb. on a single line at 185 ft. per min. They must be able to lift a 10,000 lb. load on a single line. The light hook lowering speed will approximate the light hook hoisting speed. The electric control circuit will be arranged to give a speed of 80 ft. per min. when lowering 10,000 lb. on a single hook, and the brake will be able to stop and hold that load on a single line.

The dynamic braking will bring a 5000 lb. load to rest in three seconds from a lowering speed of 300 ft. per min. The winch motors are to be of 25 hp., operating on 230 volt d.c. and will be of the series wound interpole type with a normal speed of between 400 and 600 r.p.m. All the circuit interrupting devices and resistances will be housed in a ventilated steel deckhouse, and the operating station will be on a platform built as an extension of the deckhouse top, located so as to give the operator a clear view down through the hatch.

## Chromium Plating Process

Dr. Colin G. Fink, head of the Division of Electro-Chemistry, Columbia University, has, with the help of his assistants and the research engineers of the Chemical Treatment Company, perfected commercially a process for chromium plating. The use of small percentages of chromium to produce stainless or rustless steel alloys and extremely hard chrome steels is well known.

Crodon, the trade name under which chromium plate is being produced, has been developed by Dr. Fink for the Chemical Treatment Co., Inc., 26 Broadway, New York.

There has not yet been sufficient time to carry on a series of exhaustive service tests in the marine field, but it can be stated that brightwork, the sailor's curse, now has an opportunity to appear with a chromium surface which will have a lasting brilliance, will not require polishing and will wear well. There is a field for Crodon in lengthening the life of turbine blades and of many other engine parts and ships' hardware, which are now subject to excessive wear and corrosion. Crodon is being used commercially for that portion of steam soot cleaner elements exposed to boiler gases and to the direct impingement of the flames.

A small test piece of steel pipe plated with less than one-half mill of chromium withstood a temperature of 2000 deg. for 24 hours without affecting the plated surface in any way, although the inside of this pipe, also subjected to the flame gases, was corroded to such an extent that half its thickness was eaten away.

## Personal Notes

Cary W. Cook has been elected Chairman of the Board of Directors of the American Hawaiian Steamship Company. For the last two years he has been president of the company and during his period of management several notable changes of policy were made. It is understood that when he accepted the presidency he set a limit of two years on his connection with the company in that arduous position.

Roger D. Lapham, the new president of the American Hawaiian Steamship Company is a descendant of one of the founders of the line. He was with the company for some 12 years prior to the war, and after his return from France joined the shipping firm of McCormick, McPherson & Lapham, but returned to the American Hawaiian in 1923 as treasurer of the company.

G. H. Hill, who has been in charge of the marine sales of the Sharples Specialty Company on the Pacific Coast for some years, has been appointed to the New York office where a special marine department has been opened. Mr. Hill's first experience with Diesel engines was at the Fore River Shipbuilding plant, where he worked for the Electric Boat Company in 1910 on the first submarine Diesel engines adopted by the U. S. Navy. His headquarters will be at the marine department of the Sharples Specialty Company, 500 Fifth Avenue, New York.

Walter H. Freygang, manager of the marine department of Walter Kidde & Co., Inc., has been in Europe for some time on a business trip.

L. B. Jackson has resigned from his position as superintendent of the technical division of the Texas Company (marine department) and enters the Fairbanks Morse Company's organization at Beloit, Wis., early in July. Mr. Jackson is known to readers of this magazine as a contributor of articles dealing with the operation of motorships and particular problems of engine operation. Before he joined the Texas Company he was assistant to the marine superintendent of the American Hawaiian Steamship Company. Although originally brought up on steam, he has become an ardent convert to the motorship, and has carried on considerable experimental work, particularly in connection with the burning of heavy grades of fuel oil.

Dr Ernst Foerster, consulting engineer for the Hamburg America Line returned recently to Germany after a six weeks' visit to the United States, where he came to make a study of harbor facilities. After his visit to the South and West he expressed the opinion that the arrangements for handling freight in our harbors is ahead of European practice.

Captain R. D. Gatewood, manager of the Department of Maintenance of Repairs, U.S. S.B. Fleet Corporation, returned from the West Coast the middle of last month after having inspected, among other things, the progress on the oil engines ordered in California by his department in connection with the commission of a number of steamers to Diesel power.

Ing. Giovanni Chiesa, managing director of the Fiat firm in Turin, visited the United States recently on business and returned to Italy about the end of June.

The seventh chapter of the series of articles entitled "Sketches and Working of Oil Engines," by J. Kuttner, has been held over this month and will be published in our August issue.

## Review of Recent Publications

## Government Aid to Merchant Shipping

*Special Agents Series No. 119. Bureau of Foreign & Domestic Commerce, Department of Commerce. By Grosvenor M. Jones, Commercial Agent. Revised edition. 9 in. x 5 1/4 in. 470 pp. Price 50 cents. Sold by the Superintendent of Documents, Government Printing Office, Washington, D. C.*

In this revised edition of a study of subsidies, subventions and other forms of state aid in the principal countries of the world that originally appeared in May, 1916, a review is contained of the changes that occurred in this domain between 1916 and 1923. Unprecedented shipping conditions during those years compelled governments themselves to build and, for a time, to operate ships in foreign trade on a stupendous scale. New political entities were created and many of the old ones changed. Through all these circumstances many alterations were made in the policies of nations relative to merchant shipping. A review of these conditions down to August, 1923 added to the general review of the relations of governments to merchant ships between the years 1840 and 1915 renders the revised edition of "Government Aid to Merchant Shipping" complete and up-to-date.

## The Ports of Port Arthur, Sabine, Beaumont, and Orange, Texas

*Port Series No. 14. Prepared by the Board of Engineers for Rivers & Harbors, War Department, in coöperation with the Bureau of Research, U. S. Shipping Board. 9 in. x 5 1/4 in. 148 pp. Price 75 cents. Sold by the Superintendent of Documents, Government Printing Office, Washington, D. C.*

Ninth book of the series covering all important seaports of the U. S., this book of the harbors in the Sabine district is chiefly interesting because these ports lead all Gulf ports in the shipment of petroleum products. All the Sabine ports are reached by artificial channels constructed by the United States Government. Sabine Pass is the outlet into the Gulf of Mexico of Sabine Lake and has two important tributaries, Sabine River and Neches River. Sabine is situated at the head of Sabine Pass about seven miles from the Gulf. The Port Arthur Canal extends from near the upper end of Sabine Pass to the Port Arthur docks, a further distance of about seven miles; while the Neches-Sabine Canal extends from the upper end of the Port Arthur Canal to the mouths of the Neches and Sabine Rivers. Channels suitable for ocean vessels have been provided by the United States up to Beaumont on the Neches River and to Orange on the Sabine River. The important traffic developed at the Sabine ports furnishes evidence of the willingness of ships to utilize restricted channels in order to reach points offering attractive cargo. Port Arthur is the most important of the Sabine ports, with a commerce amounting to nearly 10,000,000 tons in 1923. The report contains useful data for steamship lines, railroads, manufacturers, importers and exporters.

## The Ports of Seattle, Tacoma, Bellingham, Everett and Grays Harbor, Wash.

*Port Series No. 7. Prepared by the Board of Engineers for Rivers & Harbors, War Department, in coöperation with the Bureau of Research, U. S. Shipping Board. 9 in. x 5 1/4 in. 470 pp. Price 75 cents. Sold by the Superintendent of Documents, Government Printing Office, Washington, D. C.*

This report, which deals with the important harbors on Puget Sound, is the tenth of the

series to have been published. The location of the Puget Sound ports in the extreme northwestern part of the United States has given to them unusual advantages in the development of trade with the Orient. Location and the development of its advantages have also made Seattle the principal port for the conduct of trade with Alaska. The proximity of those ports to vast sources of timber and lumber has been an important factor in their development, particularly in the case of Grays Harbor and Everett, and has resulted in their being provided with a volume of bulk freight that attracts regular ocean services. A heavy tonnage of grain and flour, which are products of the northwestern states, supplements the forest material. In the volume is given full information for all the Puget Sound ports, of all port and harbor conditions, port customs and regulations, services and charges, and of all facilities for discharging and loading, bunkering, repairing, etc. Data are also given of the railroad freight services.

## Waterways and Inland Sea Ports

*By Brig. Gen. T. Q. Ashburn, U.S.A., Chairman and Executive of the Inland Waterways Corp. 9 in. x 5 1/4 in. 32 pp. Price 10 cents. Sold by the Superintendent of Documents, Government Printing Office, Washington, D. C.*

In order to present a full review of the interest that has been developed in inland and coastwise water transportation during the past five years while the government has been operating a barge line upon the Mississippi River, the coastal waters of Louisiana and Alabama and on the Warrior River, General Ashburn wrote a series of articles in the *Chicago News*. These have now been reprinted and form the contents of the book under review. The Inland Waterways Corp. was created by Act of Congress for the purpose of carrying on the operations of the government owned inland, canal and coastwise waterways system to the point where it could be transferred to private operation to the best advantage of the government, and the Corporation is owned and directed by the War Department. In his review of this development General Ashburn covers the whole subject from the need of this river transportation to the final results that have been attained. He relates the difficulties that the Corporation inherited from the war time administration. A large number of unexecuted contracts for new boats, a nondescript number of vessels operating at a tremendous loss and rulings of the Railroad Administration which did incalculable harm had to be taken over. The problem was to rejuvenate the system and make it profitable. General Ashburn shows how far he has succeeded in this. In dealing with the towboat problem he makes the comment that the modern towboat should have Diesel engines with either direct or electric drive, and should measure about 200 ft. in length by 40 ft. depth, drawing between 4 ft. 6 in. and 5 ft. 3 in. of water, with twin or multiple screws operating in a tunnel and with a shaft hp. of not less than 1,500. Although the Corporation is operated under the handicaps of its inheritances, the Mississippi division showed a net operating profit during the first three months of this year, after provision was made for depreciation and for a reserve for future repairs. The losses on the Warrior division have been reduced to almost nothing, and there is reasonable ground for the expectation that they will soon be converted into a profit. There is no reason why traffic cannot be developed as advantageously on the Mississippi as on the industrial rivers of Europe.

## MOTORSHIP'S List of Oil Engine Boats Registered in the United States April 1-June 1, 1925

NAME OF VESSEL	GROSS	LENGTH	BREADTH	DEPTH	SERVICE	OWNER AND ADDRESS	HORSEPOWER
ANGELINA .....	30	49.8	16.0	7.9	Fishing	Vito Favallora, 3 Suncourt Avenue, Boston, Mass. ....	45
SWAN .....	125	80.2	28.3	6.6	Dredge	Hillsboro Sand & Shell Co., Tampa, Fla. ....	101
BILLY MOORE .....	16	48.5	12.6	4.9	Towing	Moore Mill & Lumber Co., Bandon, Ore. ....	65
NANCY F. ....	64	60.5	26.0	4.5	Passenger	Mrs. N. R. Fitzgerald, Friars Point, Miss. ....	70
MARY ELLA .....	86	91.5	23.1	7.5	Oystering	Henry C. Nickelson, Point Norris, N. J. ....	90
WOLLOCHET .....	148	89.5	32.5	9.7	Passenger	Skannie Ferry Co., Gig Harbor, Wash. ....	150
ANNIE LOUISE .....	31	54.0	16.0	6.5	Fishing	Charles Ryder, Nantucket, Mass. ....	45
CHARLES M. FAUCI III .....	22	49.8	13.5	5.5	Fishing	Joseph Ciampa, 20 Orange Court, Everett, Mass. ....	45
IDAMAE .....	54	75.0	16.2	2.9	Towing	William H. Reynolds, Pittsburgh, Pa. ....	50
FRED HENRY .....	31	51.9	15.1	7.2	Fishing	Ignazio Benenati, 25 Clark Street, Boston, Mass. ....	60
ROBERT C. BONHAM .....	113	79.0	21.8	9.8	Towing	Jersey City Stockyards Co., Ft. Sixth Street, Jersey City, N. J. ....	400
LUCILLE ROSS .....	13	39.6	12.4	4.6	Towing	I. E. Shilling, Miami, Fla. ....	60
GIG HARBOR .....	159	116.2	36.8	8.4	Ferry	Tacoma Ferry Co., 1183 Dock Street, Tacoma, Wash. ....	300
SHENANDOAH .....	42	58.0	15.4	7.3	Fishing	Pasqual Dosotech, Gig Harbor, Wash. ....	65
AMERICAN KID .....	24	45.3	15.5	4.4	Fishing	Davenport-Brooks Corp., Fernandina, Fla. ....	45
ISLES OF YORK .....	20	49.2	14.4	4.5	Freight	C. H. Hunt, Jeffs, Va. ....	45
SPEY .....	18	47.2	13.8	5.9	Yacht	Robert H. McCurdy, Woods Hole, Mass. ....	45
ENDURANCE .....	42	59.2	15.5	7.3	Towing	Oil Power Towing Co., 56 Wall Street, New York, N. Y. ....	220
MARY M. ....	47	67.2	17.3	8.2	Fishing	Lungsford & Pine, 37 Roger Street, Gloucester, Mass. ....	60
JOHN M. HATHAWAY .....	52	75.0	18.4	7.9	Fishing	Andrew Hathaway, New Bedford, Mass. ....	100
ARCTIC .....	89	76.0	24.7	7.4	Freight	Vacuum Oil Co., 61 Broadway, New York, N. Y. ....	100
LOLETA .....	37	57.5	12.2	6.8	Yacht	Carlton M. Slagle, Cambridge, Md. ....	200
HERCULES No. 3 .....	14	54.5	13.3	2.3	Towing	Ray Brookbank, Higginsport, Ohio. ....	25
VANGUARD .....	52	61.2	16.5	7.4	Fishing	Spiro Bablish, Gig Harbor, Wash. ....	80
MILLER .....	43	63.9	15.0	3.2	Freight	Pine Bluff Sand & Gravel Co., Pine Bluff, Ark. ....	45
FRIEDA .....	64	68.2	17.3	7.9	Fishing	Kadiak Fisheries Co., Lowman Bldg., Seattle, Wash. ....	100
FROSTLAND .....	46	61.1	16.1	7.3	Fishing	Paul Martinis, 3121 Nassau Street, Everett, Wash. ....	80
SHARON .....	18	40.2	12.4	6.7	Fishing	E. Arntsen, 2315 South L Street, Tacoma, Wash. ....	25
NONIA .....	81	104.3	15.0	8.1	Fishing	David W. Simpson, 244 Atlantic Avenue, Boston, Mass. ....	70
MOTORMATES .....	273	114.3	32.1	8.3	Tanker	Associated Oil Co., 79 Montgomery Street, San Francisco, Cal. ....	160
SOUTH SHORE II .....	329	99.5	32.5	7.1	Freight	South Shore Port Co., Mountain View, Cal. ....	180
CREST .....	35	51.2	13.9	8.8	Towing	Wagner Tug Boat Co., Salmon Bay Dock, Seattle, Wash. ....	135
JESIMAR .....	71	76.4	15.6	9.7	Yacht	J. F. Ives, Stimson Mill Co., Seattle, Wash. ....	110
LOIS .....	14	42.6	13.0	4.1	Towing	Tampa Sand & Shell Co., Scott & Lozano Sta., Tampa, Fla. ....	60
ARGO .....	18	40.8	12.6	6.3	Fishing	J. S. Strand, 266 38th Street, Astoria, Ore. ....	25
BLANCO .....	18	40.8	12.6	6.3	Fishing	Engvold Pederson, 2214 Commercial Street, Astoria, Ore. ....	25
FLEVILLA .....	55	47.2	12.9	5.3	Yacht	Hart L. Weaver, Bush & Van Ness Avenues, San Francisco, Cal. ....	140
CYPRESS .....	44	60.4	14.9	5.9	Fishing	Bellingham Canning Co., South Bellingham, Wash. ....	80
JOHN T. HUGHES .....	73	75.7	19.8	7.2	Miscellaneous	M. M. Davis & Son, Solomons, Md. ....	200
MAC .....	14	49.8	13.0	2.7	Towing	Portsmouth Sand & Gravel Co., Ft. of Third St., Portsmouth, O. ....	60
CATHLAMET .....	53	64.9	24.9	6.2	Ferry	Cathlamet Ferry Co., Cathlamet, Wash. ....	60
DONALD M. MCNEALE .....	37	55.6	16.4	6.8	Towing	Smoot Sand & Gravel Co., Alexandria, Va. ....	165
ROBERT C. ....	8	40.6	10.9	2.7	Passenger	Carl C. Muller, Taylors Falls, Minn. ....	40
HUGH O'DONNELL .....	72	70.0	20.0	8.5	Towing	O'Donnell Towing & Transportation Co., 44 Whitehall Street, New York, N. Y. ....	300

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*List of Motorships—Equipped with Diesel Engines of the Burmeister & Wain System.* May 1, 1925.—Burmeister & Wain, Ltd., Copenhagen, Denmark.

*Cory Recony Standardized Unit Control for Motor Operation of Valves*—Bulletin No. 103-29-B, describing the features of this system of remote control for valves.—Chas. Cory & Son, Inc., 183-87 Varick Street, New York.

*Seamless Metal Hose*—Bulletin No. 201-29-A. Giving sizes and working pressures of flexible bronze or steel tube hose.—Chas. Cory & Son, Inc., 183-87 Varick Street, New York.

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*Maxim Industrial Silencers*—A 36-page booklet, including a discussion of the losses from noise, the theories of sound and their relation to gas flow, the relation between back pressure and silencing, the designing and tuning of ex-

haust systems for efficient performances, etc.—Maxim Silencer Co., Hartford, Conn.

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